A·I·B·S

bulletin

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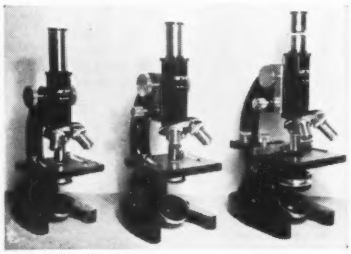

catalog sheet illustrates and describes them all. This informative literature also gives information on the *four contrasts* which are available, as well as details on applications of the phase microscope. If you are interested in the theoretical principles involved in the optical design of the new UNITRON Phase Microscopes, and the resulting advantages over the conventional phase microscopes, we'll be glad to include a technical bulletin on the subject. All of this literature is yours for the asking. We shall probably take advantage of the opportunity to include a catalog on some of our other new instruments, so if you are interested in microscopy, we think you will find it worth while to write for further information.

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EDITORIAL

A Letter to All Biologists

H. BENTLEY GLASS, *Chairman, AIBS Governing Board*

AFTER grave consideration, the Governing Board of the AIBS has made a momentous decision—that of severing its close ties to the National Research Council and of becoming independent. From the time of the founding of the AIBS, it was intended that this day would arrive whenever the AIBS had become strong enough to stand alone. In the judgment of the Governing Board, this time has now come; and as soon as three-fifths of the member societies have ratified this action, it will be effected.

The debt of gratitude owed to the National Research Council for its aid and support during the infancy of the AIBS can never be adequately repaid. By a most generous arrangement, AIBS has, during this period, received from the National Research Council quarters and services that have far exceeded in value the modest returns that could be made; and only in the last few years has AIBS been able in some measure to repay this generosity. Even more valuable than the financial assistance received has been the value of the counsel obtained by the AIBS from the experienced officers of the National Research Council. In the new relationship that will now commence, AIBS, like a grownup child toward its parent, will assuredly demonstrate every token of gratitude, respect, and affection.

It scarcely needs to be emphasized that in its new independent role, the AIBS will more than ever require the devoted support of its member societies and of individual biologists, both in regard to finances and in regard to the formulation and execution of policies. It has always been hoped that AIBS would become a voice for the biologists of our nation, and this can only be expected if AIBS becomes more truly representative, both by the inclusion of more societies than now belong to it, and also by the fuller and more frequent exchange of ideas and opinions between the AIBS and its member societies. The AIBS may indeed become the voice, but the societies themselves represent the will directing what is to be voiced; and unless biologists reflect on the crucial problems of our profession and provide the will and the breath, the voice perforce must remain dumb. Because critical problems of financial support still face the AIBS, it is also necessary for biologists to contribute more generously to the support of the Institute, over and above the very small individual contribution now made through the member societies.

I am often asked what, apart from the arrangement of annual meetings for those societies that request it and apart from the publication of the *Bulletin*, the AIBS has accomplished in past years that justifies its existence and the active support of biological societies and individual biologists. I want, therefore, to focus your attention on two major accomplishments of the AIBS that have, I believe, received too little recognition, and that could never be regarded as financially self-supporting activities.

First, let us recall the military failure to make use of the professional abilities of biologists during World War II—what was surely one of the most glaring defects to become apparent in the operation of Selective Service. After the war, when the task of revising the Selective Service law in the light of wartime experience was taken up, the most effective utilization of scientists in any war effort was a prime consideration. Physicists, chemists, engineers, medical men, and representatives of other scientific groups were on hand to point out the services rendered by their members and to emphasize the need to ensure that a continuous, adequate supply of persons with technical abilities would be maintained during the course of any future struggle. Preliminary drafts of legislation were drawn up to provide occupational deferments for these groups, and especially for young men in training for these professions. No one thought of including the biologists. It was then that the AIBS, newly organized, established a committee on selective service problems. By ably presenting to General Hershey and other officials the considerable contribution of biologists to the military effort during the war, and above all by emphasizing the point that it is impossible to tell in advance from what group of scientists there may come discoveries of major military value, this committee was able to bring about a redrafting of the legislation such that occupational deferments would apply not only to biologists in addition to the other groups aforementioned, but would be applied right across the board to all groups of persons engaged in training for highly specialized occupations. It may fairly be claimed that every young biologist who has profited in the post-war years by obtaining deferment of military service until the completion of his graduate studies owes an immeasurable personal obligation to the AIBS; and not only the student but also his professor, who thus was able to avoid the inefficiency, disappointment, and loss occasioned by the interruption of student training and the disruption of the educational program.

Secondly, let me point to the similar role played by the AIBS in the formation and organization of the National Science Foundation. When, after the close of World War II, the organization of a national agency to promote research in the pure sciences was urged upon the Congress of the United States, the early drafts of enabling legislation ignored the importance of the biological sciences as such. Biology was included merely as an adjunct of the medical sciences. Once again it was because of the arguments and persuasion of the AIBS that in the final law which was enacted, Biology emerged, with Medicine, as a strong division of the National Science Foundation. As each new announcement of research grants and aids is made, biologists have an opportunity to see what a striking effect that action has had. Again it may fairly be said that every biologist who has received from NSF a grant in aid of research, and all the many more students and technicians who have indirectly been assisted or supported thereby, are greatly indebted to the AIBS. Like the action in regard to Selective Service legislation, this effort has immeasurably profited the biological profession as a whole.

There are many more grave problems which biologists must face together in the future—hence a direct and personal appeal to each of you to shoulder that responsibility. Whether or not you have profited personally from either of the actions described above, you as a member of the biological profession have profited greatly by its enhanced position of strength and importance in the councils of our nation. Together we should support the AIBS. To make this possible, voluntary individual memberships are now to be established, so that biologists may support the aims and further the work of the AIBS, whether they are already members by virtue of inclusion in a member society or not. These memberships are announced elsewhere in this issue of the *Bulletin*, and everyone who reads these words is urged to respond.

Across the Editor's Desk

• **The National Science Foundation will award individual grants to defray partial travel expenses of a limited number of scientists who will attend the Sixth International Congress of Anatomy** to be held in Paris, France, July 1955. Blanks whereby application for grants may be made are available from the National Science Foundation, Washington 25, D. C. Completed applications must be returned to the Foundation by January 2, 1955, in order to permit time for evaluation and processing.

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• Engineering and scientific circles will welcome the news that **President Eisenhower has appointed a Cabinet Committee on the training of scientists and engineers.** The Committee includes the Secretaries of Commerce, of Labor, and of Health, Education and Welfare, the Assistant Secretary of Defense for Manpower, and Directors of the Atomic Energy Commission, the National Science Foundation, and the Office of Defense Mobilization. Dr. Fleming will serve as chairman. The Committee, appointed in May, held its first meeting on July 21, 1954.

Realization of the rapid advances in Soviet science and technology, and of the phenomenal growth of Russia's manpower pool of engineers, scientists, and technicians, in contrast with the shrinkage of our professional output, was an important factor in prompting Presidential action.

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• ***Human Biology,*** founded in 1929 by the late Raymond Pearl, **will be published by the Wayne University Press, under the editorship of G. W. Lasker,** Assistant Professor of Anatomy, Wayne University College of Medicine. This twenty-six-year-old quarterly will continue to be a "record of research," with special emphasis on the biometry and growth of man and other primates. Though published in America, *Human Biology* will remain international in coverage, accepting articles from the entire world. The September issue (Vol. 26, No. 3) is being edited as a memorial to the late Earnest A. Hooton, for 40 years Professor of Physical Anthropology at Harvard University, and contains an article by him. Besides Dr. Lasker, the editorial board includes Josef Brozek, University of Minnesota; Bentley Glass, The Johns Hopkins University; Donald Mainland, New York University School of Medicine; James N. Spuhler, University of Michigan; and William L. Straus, Jr., The Johns Hopkins University.

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• The Surgeon General of the Public Health Service has announced a **Predoctorate Research Fellowship program at the National Institutes of Health.** These Research Fellowships in Health, Medical Sciences and related fields will be available to successful candidates with Bachelor's or Master's degrees or equivalent training. Stipends vary from $1400 to $1800, with a $350 allowance for spouse and each dependent child. Basic tuition and certain travel allowances will be paid. Application may be made at any time. Information and application blanks may be obtained from: Research Fellowships Branch, Division of Research Grants, National Institutes of Health, Bethesda 14, Md.

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• **The journal, *Tropical Woods*, is again being published on a regular basis,** according to an announcement by William L. Stern, Editor. For the time being, it will appear semiannually but if enough articles are forthcoming, the number of issues will increase. *Tropical Woods,* published at the Yale University School of Forestry, was founded in 1925 by Samuel J. Record, who served as its editor until his death in 1945. The journal is designed to furnish a suitable publication medium for papers on wood anatomy, tropical woods and woody plants. It is devoted to the promotion of forestry in the tropics. The subscription rate will be $1.50 per year or $1.00 per single issue. Further information about subscriptions or manuscripts may be obtained by writing to: William L. Stern, Editor, *Tropical Woods,* 205 Prospect Street, New Haven, Connecticut.

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• **Raymond W. Barratt has been appointed Assistant Professor of Botany at Dartmouth College,** in charge of the Microbiological program. Dr. Barratt previously was Research Biologist and Acting Assistant Professor at Stanford University. Coming to Dartmouth with him is **Wilbur T. Ebersold,** who is a Public Health Service Research Fellow of the National Cancer Institute.

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• **The 1954 "Heroes of Science" stamps,** commemorating the great British physicist, Sir Isaac Newton, are being offered to the public this month by the Worcester Foundation for Experimental Biology, Shrewsbury, Mass. This Foundation is a non-profit corporation, without endowment, that makes its findings available to the public. It is dependent for its existence upon research and philanthropic grants and memberships and gifts from the public. The new stamp sheets, third in the annual fund-raising series, will have no postage value but will help further research projects in diseases such as cancer, arthritis, heart ills, mental illness, muscular dystrophy, effects of atomic radiation and many others. Gregory Pincus is Director of the laboratory, which utilizes the skills of approximately 120 scientists. Contributions for the stamp sheets are entirely voluntary.

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• **Marvel L. Baker,** Associate Director of the Nebraska Agricultural Experiment Station, Lincoln, and **Truman E. Hienton,** head of the Dept. of Agriculture's Farm Electrification Section, Beltsville, Md., **have been elected members of the Scientific Manpower Commission.** Their election, representing agricultural fields, brings the membership of the Commission to 18 and the representation to nine major fields of scientific activity. The Scientific Manpower Commission, formed by the leading scientific organizations early in 1953, keeps a close watch over the supply of and demand for scientists in industry, government, education, and the armed forces, and advises on shortages that develop or are threatening in any field. (See report on page 30.)

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• **The 20th North American Wildlife Conference will be held in Montreal, Canada, in March 1955,** under the sponsorship of the Wildlife Management Institute. The stake of the United States, Canada and Mexico in the restoration and management of their renewable natural resources will be emphasized in the central theme of the Conference, "Natural Resources Use—A Contintental Challenge." Approximately 60 papers will be selected for presentation during the sessions and will be published later in the *Transactions.* Technical sections and dates are: Disease, Nutrition and Controls (March 14); Wetland and Inland Water Resources (March 14); Upland Game Resources (March 15); Marine, Coastal, and Fur Resources (March 15); Big Game Resources (March 16); Conservation Information Opportunities (March 16). Frank L. Campbell, Director of AIBS, will be chairman of a general session on Current Problems and Future Needs, Tuesday afternoon, March 15.

• **The Federation of American Societies for Experimental Biology recently moved into permanent headquarters at 9650 Wisconsin Avenue, Washington 14, D.C.** This property is located in Bethesda, Maryland, about a mile north of the National Institutes of Health and the Naval Medical Center. With a minimum of remodeling the large stone house on the estate (38 acres of land) has been converted into an ideal building for the offices of the Federation and its constituent societies. The offices of the American Physiological Society and its publications have already moved into the new quarters and it is envisioned that eventually most of the other Federation societies will establish headquarters there. The Federation is composed of the following societies: The American Physiological Society, The American Society of Biological Chemists, The American Society for Pharmacology and Experimental Therapeutics, The American Society for Experimental Pathology, The American Institute of Nutrition, and The American Association of Immunologists.

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• **Recent appointments and changes in the Division of Biology and Agriculture of the National Research Council include:** (1) **Russell B. Stevens** has been appointed Executive Secretary of the *Biology Council* (*AIBS Bulletin*, April 1954, p. 13). Dr. Stevens, who took his Ph.D. in plant pathology at the University of Wisconsin, 1940, has taught at several southern institutions and was co-author of a recent textbook, "Diseases in Plants." (2) Associated with the Biology Council is the new *Committee on Educational Policies*, whose membership is as follows: Howard M. Phillips, Emory University, *Chairman;* John A. Behnke, Amer. Assoc. for the Advancement of Science; Thomas S. Hall, Washington University; John A. Hannah, Michigan State College; Theophilus S. Painter, University of Texas; E. Laurence Palmer, National Wildlife Federation; and Donal Sheehan, New York University College of Medicine. The work of assembling facts for the consideration of this committee is being done by Richard E. Paulson, University of Chicago, who will become Staff Assistant on October 1. (3) **Paul E. Johnson** has been appointed Executive Secretary of the *Food Protection Committee* of the Food and Nutrition Board. Dr. Johnson has been with the Agricultural Relations Division of the Tennessee Valley Authority.

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• The country's crop and soil scientists have many special skills that are useful to the nation in time of war, **a recent survey conducted by the Agronomic Manpower Resources Committee of the American Society of Agronomy** has shown. Chairman of the Committee is C. L. W. Swanson, Chief Soil Scientist at the Connecticut Agricultural Experiment Station. Other members are: W. A. Albrecht, University of Missouri; W. G. Leonard, Colorado State College; J. B. Peterson, Purdue University; J. A. Rigney, North Carolina State College; L. N. Skold, University of Tennessee; and S. A. Taylor, Utah State Agricultural College. Information was obtained from questionnaires answered by crop and soil scientists who had received their college degrees after 1941—a group most likely to have seen military service in the second World War. The answers furnished information about professional background and experience, military record and proficiency in 24 categories useful in defense activities.

Over 50 percent of the scientists replying were reservists. In the report on the survey it was made clear that crop and soil scientists were not asking for special privileges. They do ask that their talents and training be used in jobs for which they are especially trained, either in the military or in a civilian capacity, and not indiscriminately wasted, as was so often the case in World War II. Since a shortage of trained agronomists exists now, any stepped-up tempo in wartime would make the need even greater.

In the questionnaire the greatest number of crop and soil scientists listed themselves as trained to supervise the production of food—for civilian consumption in combat areas, on isolated military bases, and for the rehabilitation of conquered areas, should their services be more useful in a military than civilian capacity. Other categories checked most frequently were: (1) supervision of the establishment of suitable vegetation at military airports, (2) development and production of chemurgic and textile plants, (3) participation in wartime chemical research and wartime chemical industry, (4) advising on efficient utilization and distribution of basic fertilizer materials, and (5) soil mapping for trouble areas. The questionnaire revealed that 95 percent of the scientists with master's degrees served at least three years in the Armed Forces during W. W. II. This percentage was 77 for those with doctor's degrees.

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• **Applications for grants for Scholars in Cancer Research are being accepted** by the Committee on Growth of the National Research Council, acting for the American Cancer Society.

These awards are designed to bridge the gap between the completion of fellowship training and the period when the young scientist has thoroughly demonstrated his competence as an independent investigator. A grant of $18,000, payable over three years, will be made to each Scholar's institution as a contribution toward his support, his research or both. Each institution may submit more than one application. These grants are not restricted to the support of individuals who have held American Cancer Society Fellowships. *Applications should be submitted by institutions on behalf of a candidate prior to January 1, 1955.* Application blanks and additional information may be obtained from the Executive Secretary, Committee on Growth, National Research Council, 2101 Constitution Avenue, N. W., Washington 25, D. C.

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• **A student loan fund, for needy doctoral candidates in zoology, has been established at the University of Illinois in honor of the late Professor Harley J. Van Cleave,** eminent zoologist and a member of the faculty from 1911 until his death in 1953. Prof. Van Cleave's former students, colleagues, and friends chose the loan fund as an appropriate memorial because in his lifetime he has so often lent financial assistance to needy students. Discarding the idea of an outright gift to such students, the initiators of the memorial to Prof. Van Cleave pointed out that if an eligible graduate student in need of assistance is unwilling to provide the same opportunity to others, he is not the type of person the fund is intended to help. No interest will be charged but paid-up recipients will be advised that voluntary contributions to the fund will be welcome. Should the fund subsequently increase beyond the needs of the applicants, memorial scholarships will be established with the excess.

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• A preliminary meeting was held recently to discuss the **possibility or advisability of developing a uniform system for use in coding biological taxonomic entities.** Participants at this exploratory meeting were from the Library of Congress, the U. S. Department of Agriculture, the Smithsonian Institution, and the Chemical-Biological Coordination Center of the National Research Council.

It is known that several laboratories are entering the results of their experiments on machine or hand-sorted punch cards and that at least a few are listing the species of plants or animals tested by means of a code on these punch cards. In order to facilitate the exchange of information between various laboratories, it would seem to be highly desirable for these research groups to use a uniform taxonomy coding system. If the need or usefulness of uniformity is confirmed by sufficient biologists, a start on the formation of a stardardized code should be made as soon as possible so the conversion from

individual codes can be accomplished with a minimum of effort.

The interested persons who have been informally discussing the project do not want to set plans in motion for the actual codification unless there is a real or potential need for it. The immediate problem, therefore, is to determine what areas of biology could be usefully served by a standard taxonomic code. It is requested, at this time, that those who have worked out or adopted a system for coding taxonomic entities, or who may be conducting work which might benefit from such codification, submit their opinions concerning a standardized biological taxonomy code. Letters should be addressed to: *Dr. G. Congdon Wood, Chemical-Biological Coordination Center, National Research Council, 2101 Constitution Avenue, N. W., Washington 25, D. C.*

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• **The National Science Foundation** will award individual grants to defray partial travel expenses of a limited number of scientists who will attend the **International Symposium of the Biometric Society,** to be held at Campinas, near São Paulo, Brazil, July 4-8, 1955. Blanks whereby application for grants may be made may be obtained from the National Science Foundation, Washington 25, D. C. Completed applications must be returned to the Foundation by December 31, 1954, in order to permit time for evaluation and processing.

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• **Argonne National Laboratory** will accept applications, until December 15, 1954, for **temporary research appointments.** Positions are available in biology, chemistry, engineering, medicine, metallurgy, and physics. These temporary positions are reserved each year for members of university and college faculties who will return to their academic institutions after their stay at the Laboratory. Appointments will ordinarily be made for a period of approximately one year although applications for the summer, or other periods less than one year, will be considered. Each applicant must be endorsed by his own academic institution. Further information and applications may be obtained by communicating with J. C. Boyce, Associate Laboratory Director, Argonne National Laboratory, P. O. Box 299, Lemont, Illinois.

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• **November 1, 1954 is the closing date of competitions for Fulbright grants** for 1955-56. Scholarship application blanks are available from the Institute of International Education, 1 East 67th Street, New York City, or in the offices of Fulbright advisors in colleges and university campuses. A brochure describing the overseas study awards may be obtained from the Institute. The closing date for applications to New Zealand must be set at October 15, 1954. Countries where U. S. graduate students may study under the Fulbright Program are Australia, Austria, Belgium and Luxembourg, Burma, Ceylon, Denmark, Egypt, Finland, France, Germany, Greece, India, Italy, Japan, the Netherlands, New Zealand, Norway, Pakistan, the Philippines, Sweden, the Union of South Africa, and the United Kingdom. Eligibility requirements are: (1) United States citizenship, (2) A college degree or its equivalent, (3) Knowledge of the language of the country sufficient to carry on the proposed study, and (4) Good health. Fulbright awards are made entirely in the currencies of participating countries abroad. The awards cover transportation, expenses of a language refresher or orientation course abroad, tuition, books, and maintenance for one academic year.

November 1, 1954 is also the closing date the applications for the Buenos Aires Convention Program for 1955-56. Planned for Inter-American Cultural Relations, the Buenos Aires Program has made awards to 97 Americans since its inception in 1937. Countries participating are Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Guatemala, Haiti, Honduras, Nicaragua, Panama, Paraguay, Peru, and Venezuela. Eligibility and conditions of awards in this Program are similar to those for Fulbrights.

From the Editor

WE HAVE returned from the campus of pine and palm, the University of Florida at Gainesville, with renewed faith in the future of AIBS.

Dr. Hiden T. Cox, Deputy Executive Director of AIBS during the past year, was Convention Director, and with the generous support of the officers of the University of Florida, the assistance of the local committee, and the best weather that Florida can provide in September, he staged a memorable meeting on which he is reporting (page 32). Now he has returned to Virginia Polytechnic Institute as Professor of Botany. Members of AIBS should be grateful to him, not only for his smooth direction of the Gainesville meetings, but for his efficient management of the AIBS office during the year. He will be missed here in Washington, particularly by the writer who came to lean heavily upon his administrative ability. For at least another year AIBS will have the benefit of part of his time, since he will handle arrangements of the 1955 annual AIBS convention at Michigan State College.

During the week prior to the opening of the Gainesville meetings, we attended on the same campus a much smaller meeting sponsored by the National Association of Biology Teachers and supported by the National Science Foundation. Known as the Southeastern Work Conference on Biology Teaching, it was organized by Richard L. Weaver and Samuel L. Meyer, who served AIBS devotedly as Executive Director during the year 1952-1953. Altogether 94 people participated in this conference—interested men and women selected chiefly from the southeastern states—high school biology teachers, college and university teachers of biology or education, educational administrators, including the heads of several state departments of education. The emphasis of the conference was on the improvement of the teaching of biology in high school through the encouragement of the teachers, with respect to their recruitment, education, in-service training, incentives, facilities. Prejudice between teachers of subject and teachers of pedagogy, between research workers and teachers, or between teachers and administrators could not long survive in discussion groups where all components were represented. It is not enough to view with alarm or make recommendations for others to carry out; every interested person who is not a high school teacher of biology can become acquainted with at least one such teacher in his community and find out what his problems are and what needs to be done to make his teaching more satisfying to him and more attractive to his students.

This workshop was planned to overlap the AIBS meetings in order to encourage the visiting teachers to stay over for the scientific sessions, and many of them did. Assigned to action teams at the conference, these teachers will try to put into effect in their own states the recommendations of the conference. Thus AIBS collaborated with its newest member NABT and with NSF to help biological education.

During the AIBS meetings we had the privilege of becoming better acquainted with Dr. H. Bentley Glass, the new Chairman of AIBS. We watched him preside at the meeting of the Governing Board and at the general meeting of AIBS and we admired his gracious and effective performance. He not only knows the history of AIBS and its present problems but he envisages what AIBS can and should become, and he will give time and effort toward the realization of his dreams.

Just knowing Chairman Glass is enough to rekindle one's faith in AIBS; but that is not all—it has an Executive Committee and Governing Board who are equally interested in its future. They have made two very important decisions, both involving amendments to the Constitution and therefore requiring the approval of three-fifths (11) of the member societies for final adoption and implementation. In his stirring "Letter To All Biologists" (page 5) Dr. Glass has called attention to these amendments and their significance; additional information is given below.

One amendment involves the separation of AIBS from its parent, the National Research Council; the other calls for the addition of four categories of individual memberships to the present society (and individual) memberships (see page 16 for details).

The new individual memberships (life, sustaining, and professional) are intended primarily to increase the income of AIBS by giving every biologist who believes in the Institute an opportunity to identify himself with it and support it personally. Any member of a member society who chooses to become a life member, sustaining member, or professional member of AIBS will pay the required dues *in addition* to the amount that he pays AIBS through his member society or societies.

If a prospective individual member is not a member of a member society, he will, of course, receive the BULLETIN upon becoming a member in any other category. Please consider whether you yourself might not now apply for life membership, sustaining membership, or professional membership. If the spirit moves you to write a check at once, please do so and send it to the AIBS office at 2101 Constitution Avenue, N.W., Washington 25, D. C.

From the Societies

• **The American Society of Parasitologists** will meet with the American Society of Tropical Medicine and Hygiene in Memphis, Tennessee, November 3-6, 1954. A joint symposium on Schistosomiasis has been scheduled, under the direction of D. B. McMullen, Vice-President of ASP.

• **The Botanical Society of America,** at its annual meeting in Gainesville, Florida in September, **elected the following officers:** President: Oswald Tippo, University of Illinois; Vice-President: Harriet Creighton, Wellesley College; Secretary: Harold Bold, Vanderbilt University; Treasurer: Harry Fuller, University of Illinois; Business Manager: William Drew, Michigan State College.

• **The sixth annual foray of the Central States Section of the Botanical Society of America** was held June 15-20, 1954 with the University of Arkansas as host. Dwight Moore was section chairman and Hugh Iltis was chairman of the local committee. Thirty-one people took part in the foray which began with a trip to study local ferns and continued with a 700-mile excursion through the Ozark and Ouachita regions to Grassy Lake and the Annon (Cretaceous) chalk bed near Foreman before returning to Fayetteville. On Monday evening, following a picnic supper at the Trout Farm, Dr. Moore and Mr. Ernest J. Palmer gave illustrated lectures on the flora and geology of the area to be covered. At the annual business meeting Thursday evening, T. G. Yunker of DePauw University was elected Chairman, Paul Weatherwax of Indiana University, Vice-Chairman, and Dwight Moore of Arkansas University, member of the Executive Council. The 1955 foray will be in Indiana.

• Because extensive advances in many aspects of biological oceanography have been made since the last comprehensive general review twelve years ago, the **AIBS Committee on Hydrobiology, advisory to the Office of Naval Research,** has undertaken a program calling for a series of reviews by prominent specialists. The initial phase of this program will be a symposium of five subjects, to be presented at the AAAS Meeting in Berkeley, California, December 26-31, 1954. **The American Society of Limnology and Oceanography and the Ecological Society of America are co-sponsoring this symposium on "Recent Advances in Biological Oceanography."** The following topics will be reviewed: (1) Distribution of Nutrients in the Equatorial Central Pacific Ocean, by Townsend Cromwell and Thomas Austin; (2) Fluctuations in Clupeoid Fish Populations, by John C. Marr; (3) Sound Scattering in the Ocean, by Gordon H. Tucker; (4) Ecological Adaptations to Cold by Arctic Marine Organisms, by Norman Wilimovsky; and (5) Sound Production by Marine Organisms, by Marie Poland Fish. Robert W. Hiatt will serve as chairman of the symposium.

• **The Fifty-first Annual Meeting of the American Society of Zoologists** will be held at the University of North Carolina, Chapel Hill, on December 28-30, 1954. This marks the first time in nineteen years that the society has not met jointly with either the AAAS or the AIBS. Individual papers will be read and demonstrations shown. A Presidential symposium on "A New Look at the Cell" and an informal evening session, "Where is the Next Generation of Zoologists Coming From and What are We Going to Do About It?", are planned. Walter Wilson, President of the Society, will deliver the dinner address on "Bread, Butter and Biology." Reservations may be obtained by writing to Dr. W. L. Engels, Dept. of Zoology, University of North Carolina, Chapel Hill, N. C. All other information may be had by communicating with the Society Secretary, Rudolf T. Kempton, Dept. of Zoology, Vassar College, Poughkeepsie, N. Y.

• "Our Changing Forests" will be the theme of the **Fifty-fourth Annual Meeting of the Society of American Foresters,** to be held in Milwaukee, Wis., October 24-27. Headquarters will be in the Schroeder Hotel. Eleven technical sessions have been scheduled. This meeting is of particular regional importance because forty percent of the Lake States area is in commercial forest land and the region is a major center of pulpwood production and the manufacture of paper products. An attendance of one thousand members, from the United States and Canada, is expected.

• **The American Society of Plant Physiologists recently elected the following officers:** President: Alden S. Crafts, University of California, Davis; Vice-President: Harry A. Borthwick, U. S. Bureau of Plant Industry, Beltsville, Md.; Executive Committeeman, Paul J. Kramer, Duke University, Durham, N. C.; Members of the Editorial Board, *Plant Physiology,* T. C. Broyer, University of California, Berkeley, and Arthur W. Galston, California Institute of Technology, Pasadena. All officers will assume their new duties January 1, 1955.

• Individuals or libraries are invited to purchase copies of the **Thirty Year Index to *Ecology*** from the Business Manager of the journal, Dr. H. J. Oosting, Box 6875, College Station, Durham, N. C. This index covers Volumes 1-30, 1920-49, and is priced at $4.00, postpaid if a check accompanies the order.

• **Officers of the American Society for Horticultural Science** for 1954-55 are: President: E. S. Haber, Iowa State College; Vice-President: M. B. Davis, Dominion Experimental Farm, Ottawa; Secretary-Treasurer: Freeman S. Howlett, Ohio State University, Columbus.

• **The American Phytopathological Society** held its 1954 annual meeting in August at Estes Park, Colorado. Approximately 1,100 members and guests attended. Two hundred and eight papers were presented and two special

symposia held: "Concepts and Problems of Virus Diseases of Plants" and "Concepts and Problems of Nematode Diseases of Plants." Officers elected for 1954-55 were: President: J. H. Jensen, Iowa State College; President-Elect: Helen Hart, University of Minnesota; Vice-President: George W. Fischer, Washington State College; Secretary: Glenn S. Pound, University of Wisconsin; Treasurer: Saul Rich, Connecticut Agricultural Experiment Station.

• **The 1954 annual meeting of the Entomological Society of America** will be held at the Rice Hotel, Houston, Texas, December 6-9, 1954. A program of contributed papers is planned and approximately 800 American and Canadian entomologists are expected to convene.

• **Officers of the Society of Protozoologists for 1954-55** are: President: Lowell E. Noland, University of Wisconsin; Vice-President: Alfred M. Elliott, University of Michigan; Treasurer: William F. Diller, University of Pennsylvania: Secretary: Norman D. Levine, College of Veterinary Medicine, University of Illinois, Urbana, Ill.

• **Folke Skoog,** University of Wisconsin, **was this year's recipient of the Stephen Hales award,** granted annually by the American Society of Plant Physiologists to the scientists who have made outstanding contributions in that field. Dr. Skoog was selected for his work on auxins and his contributions to the technique of growing tissue cultures.

The A.I.B.S. Reports

• With the departure of Hiden T. Cox, Deputy Executive Director of AIBS during the past year, **Berton F. Hill** joined the staff to handle part of the work previously performed by Dr. Cox and to assist Dr. O. N. Eaton in the work of the Institute of Animal Resources. Mr. Hill is a mammalian geneticist who has worked at the University of Chicago with Dr. Sewell Wright and spent considerable time at the Roscoe B. Jackson Memorial Laboratory in Bar Harbor.

Dr. Cox will continue to serve as Convention Director of AIBS and all correspondence in connection with the 1955 meeting at Michigan State College should be addressed to his attention, AIBS Office, 2101 Constitution Avenue, Washington 25, D. C.

• Another step has been taken toward the completion of a handbook of numerical values pertaining to biology. **"Standard Values in Nutrition and Metabolism,"** prepared under the supervision of the AIBS Committee on the Handbook of Biological Data, is being distributed, currently, as Wright Air Development Center Technical Report 52-301, and is issued under the joint sponsorship of the Air Force, Army, Navy, and Atomic Energy Commission. It will be available in a commercial edition from W. B. Saunders and Company, Philadelphia, in October 1954. The first "fascicle," "Standard Values in Blood," issued two years ago, has already established itself as an indispensable and widely used tool.

"Standard Values in Nutrition and Metabolism" is the product of the contributions of over 800 specialists in this country and abroad. Its 160 tables were subjected to extensive review by experts who stripped away all controversial, questionable, or borderline material. The reader will find tables devoted to listing the chemical elements and compounds that are essential as nutrients for specific classes of organisms, to all compounds accepted at present as vitamins, and to the many additional substances identified as "growth factors." Sample diets that have been found satisfactory in actual use are given for various animals. Several pages are devoted to tables of zoo diets —the first comprehensive publication of such information. Insect diets and culture media for protozoa are also listed. Corresponding information is presented for plant forms and includes fertilizers and culture media. Nutrient composition of foodstuffs and feedstuffs, the functions, so far as they are known, of each of the nutrients, and the signs of their deficiency and excess are given. A section devoted to the pathways of metabolism is included and contains diagrams outlining the chemical changes in protein, carbohydrate, and fat digestion and absorption, the successive steps in the metabolism of each and the Krebs cycle and the cytochrome system. The final section of the book is devoted to basal and resting metabolic rates with a table of basal metabolism for man, prepared by Walter M. Boothby and Eugene F. DuBois.

A.I.B.S. PLACEMENT SERVICE

Many biologists may be interested in one of the most active services of the AIBS—the Placement Service. Twice a year (January and June) a list of registrants is distributed to interested prospective employers. Each list, sometimes carrying the *curriculum vitae* of as many as 125 registrants, may be purchased for $1.00.

Biologists who wish to avail themselves of this Service may do so upon registration and payment of the following fees:

A biologist in good standing of an AIBS Member Society .....$ 2.00 per listing

A biologist in good standing of an AIBS Affiliate Society .....$ 5.00 per listing

Any other biologist.....$10.00 per listing

Any biologist, regardless of society affiliation, who wishes "confidential" service, i.e., avail himself of placement services without published listing .....$20.00 per year

Biologists who wish to be included in the January, 1955, list of registrants should complete registration forms and return them to the AIBS Placement Service by *November 30, 1954.*

The Biology Library

One copy of each publication submitted for listing should be sent to the Editor, The AIBS Bulletin. 2101 Constitution Avenue, Washington, D. C. Only books published within a year of receipt will be reviewed. Older books will be listed.

ANIMAL SCIENCES

Representative Chordates. A Manual of Comparative Anatomy. CHARLES K. WEICHERT. 204 pages, illustrated. McGraw-Hill Book Company, 330 West 42nd Street, New York 36, N. Y. (1954) $3.50.

The anatomy of four representative chordates is described in detail in this well-illustrated volume: the marine lamprey, *Petromyzon marinus;* the spiny dogfish, *Squalus acanthias;* the mudpuppy, *Necturus maculosus;* and the cat, *Felis domestica.* Complete dissection instructions are given and each new term or name of an anatomical structure, when first introduced into the text, appears in bold-face type. The manual may be used separately or as a companion volume to "Elements of Chordate Anatomy" by the same author. Dr. Weichert is Professor of Zoology at the University of Cincinnati.

A Methodical, Psychiatric and Statistical Study of a Large Swedish Rural Population. TAGE LARSSON and TORSTEN SJOGREN. 250 pages. Ejnar Munksgaard, Norregade 6, Copenhagen, Denmark. (1954) 25 Swedish crowns.

This study is based on the so-called period method and is a statistical and genetic analysis of psychoses and low-grade oligophrenia over a relatively long period and in a geographically limited area. The probands are all those persons born or domiciled in the area who were, during the period in question, registered as mentally diseased or mentally deficient in the parish registers, or who were, during the same period, patients in mental hospitals or inmates of asylums. The study also gives an analysis of the frequency and morbidity—risks of mental disorders among the parents and sibs of the probands. The study covers 45 years of registration for a rural Swedish area with about 25,000 inhabitants, and comprises 1,312 registered cases. The results of the investigation will be published in two parts.

The Energetics of Development: A Study of Metabolism in the Frog Egg. LESTER G. BARTH and LUCENA J. BARTH. 117 pages. Columbia University Press, 2960 Broadway, New York 27, N. Y. (1954) $3.00.

To celebrate the 1954 Bicentennial of Columbia University, a series of twelve special Editions and Studies have been published by the Columbia University Press. This compact, attractive volume is one in the series. The authors, husband and wife, are both engaged in research in chemical embryology at Columbia. The monograph is restricted to work on *Rana pipiens* and the papers are those appearing after 1949, since Brachet in 1950 reviewed the literature up to that time. In addition to recent work on protein and carbohydrate metabolism, and the metabolism of gastrular explants, the contents cover the general nature of energy transfer in organisms; storage of energy in the frog oocyte; release of energy during embryonic development; metabolism of frog gastrula parts; and chemical and electrophoretic studies on frog egg proteins.

Zoology. CLARENCE J. GOODNIGHT and MARIE L. GOODNIGHT. 730 pages, 217 illustrations. The C. V. Mosby Company, 3207 Washington Boulevard, St. Louis 3, Mo. (1954) $6.50.

The senior author of this new general zoolgy text is an Associate Professor at Purdue University. In planning the introductory course, there, Dr. Goodnight was faced with a dilemma common to most instructors today—how to incorporate the new concepts in biology within the framework of an existing course and a rigid time schedule. Rather than delete, an attempt was made to integrate. This text is the one designed for the new course. Although it follows the sequence of the Purdue course, the chapters are arranged in such a fashion that it is possible to begin with any one. The book is divided into five sections: I, Introduction, which deals with physiology and general classification; II, The Vertebrate Organ System, largely anatomy; III, The Cell as the Basis of Organic Activity, which covers embryology, genetics and evolution; IV, The Animal Kingdom, a discussion of all phyla; and V, Ecology.

The Biology of Man. JOHN S. HENSILL. 440 pages, illustrated. The Blakiston Company, 575 Madison Avenue, New York 22, N. Y. (1954) $5.50.

This book is intended for an introductory course in General College or Education and is organized to trace the life history of man. It is not a text of general biology since it traces the principles of animal biology only as they apply to man. The author states in his preface that his objectives in writing the book were to help the student "(1) to understand the relation of other organisms to, and the effects of other organisms on, the human organism; (2) to understand the normal, and some of the abnormal, processes involved in the origin and development of human life; (3) to understand the mechanism by which human characteristics are, or are not, inherited; and (4) to understand and appreciate the place, force, and significance of biological science in our modern society." Numerous line drawings and photographs highlight each chapter and the writing is easy and interesting in style.

Human Physiology. W. B. YOUMANS. 481 pages, illustrated. The Macmillan Company, 60 Fifth Avenue, New York 11, N. Y. (1954) $6.00.

Dr. Youmans, who is Professor of Physiology at the University of Wisconsin, has written a text in human physiology that may be used at an elementary level or for students who have completed work in introductory biology and chemistry. For the latter Section I may be omitted. Section II presents the physiology of muscle, nerve and the characteristics of reflex action. The study of the organ systems begins with Section III and the central nervous system and senses are discussed in Section VII. The systematic consideration of the endocrine glands and reproduction, Section VIII, occupies the final pages of the book. Part of the text matter is printed in smaller type; this portion covers background material in related sciences, methods and more advanced physiological concepts. These sections may be omitted in an elementary course and added when the book is being used by more advanced students. A glossary of terms is included as well as a selected list of references for further reading.

An Introduction to the Study of Insects. DONALD J. BORROR and DWIGHT M. DELONG. 1030 pages, 634 figures. Rinehart and Company, 232 Madison Ave., New York 16, N. Y. (1954) $9.00.

On the title page of this textbook the authors have indicated their specialties by two line drawings: for Donald J. Borror, a dragonfly; for Dwight M. DeLong, a leafhopper. The senior author, who was a student and the successor of the late Clarence H. Kennedy at Ohio State University, is more than a student of Odonata; he is also an ornithologist and naturalist. The emphasis of the book on identification of insects

to families with the help of keys and abundant line drawings of wing venation and other characters of adult insects reflects the taxonomic interests of both authors. The junior author (senior in age and experience) is a well-known economic entomologist, who is probably responsible for the chapters on the relation of insects to man and on insect control. Thus the book does not lose sight of the economic importance of insects while concentrating on the study of insects themselves in all their amazing variety. Features that may deserve special mention are the help given the student in the pronunciation of scientific names of insects, suggestions on the collection and preservation of insects and on "things to do in studying insects." This book in the hands of one who wants to learn will facilitate his metamorphosis into an entomologist.

Control of Rats and Mice. Rats, Vol. I, pp. 1-306; Vol. II, pp. 307-521. Edited by DENNIS CHITTY. House Mice, Vol. III, pp. 1-225, Edited by H. N. SOUTHERN. (The Clarendon Press, Oxford, England.) The Oxford University Press, 114 Fifth Avenue, New York, N. Y. 1954.

These three volumes contain the results of extensive research on rodent control carried on by the Bureau of Animal Population from September 1939 to July 1947. The purpose of the study was the prevention of any outbreak of rodent-carried disease in England during World War II. Studies were made of rodent poisons, including methods of preparation, their physical and chemical properties, toxicity and effects on rodents, other animal and man; of the feeding habits of rats and mice, including variability of food materials, food and water requirements for growth and reproduction, food preferences and the effect of abundances or scarcities on rodent concentration. Methods of setting baits, the selection of baits, behavior of rats and mice toward different baits, deterioration of poisons by storage, and direct poisoning compared to prebaiting were considered in their role as factors limiting success in rodent control. The summaries and conclusions following the various sections and chapters are supported by numerous tables compiled from laboratory and field experiments, and statistically analyzed whenever the nature of the data permit.

The Birds of Travancore and Cochin. SÁLIM ALI. 436 pages, illustrated. Oxford University Press, 114 Fifth Avenue, New York 11, N. Y. (1953) 25 rupees.

The United States of Travancore and Cochin, two southwestern provinces of India, is the area in which this bird survey was conducted in 1931-32 and 1947. The field habits and general characters of more than 360 species are described and 101 species are beautifully illustrated in color by D. V. Cowen. These full color plates, a feature of the book, are well executed and their reproduction is excellent. "The avifauna of Travancore is particularly replete with examples of species which are now cut off from their nearest congeners by hundreds of miles of country unsuited to their life-conditions and provides support for the theory that the Malayan elements here are relict populations of a former distribution that stretched without interruption across the Indian peninsula." The author has published other books on Indian birds and is a foremost ornithological authority in that country.

Protozoology. RICHARD R. KUDO. 966 pages, 376 illustrations. Charles C. Thomas, Publisher, 301 East Lawrence Avenue, Springfield, Ill. (4th edition, 1954) $10.75.

The fourth edition of this widely used text in protozoology adheres to the chapter arrangement and general plan of previous editions. For students and instructors who wish to study further on certain topics, the chapter bibliographies have been expanded considerably in this new edition. Certain revisions have been made in the content in the light of recent publications. Many old illustrations have been replaced by more suitable ones and 126 new illustrations added. The index has now been divided into author and subject sections—a change that should greatly facilitate the ease of using the text.

PLANT SCIENCES

Guide to Popular Floras of the United States and Alaska. (Bibliographical Bulletin No. 23 of the U. S Department of Agriculture.) S. F. BLAKE. 56 pages Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. (1954) $0.25.

A handy reference booklet for all naturalists, this small volume is an annotated, selected list of nontechnical works for the identification of flowers, ferns and trees. Approximately 30 general publications are listed and all other specific references are grouped by states. Each entry gives title, author, pages, publisher, date and price, as well as a brief description of the material covered in each book.

The Fern and Fern Allies of Minnesota. ROLLA M. TRYON, JR. 166 pages, illustrated. University of Minnesota Press, Minneapolis 14, Minn. (1954) $2.75 paper, $4.00 cloth.

Except in prairie regions, ferns are a conspicuous part of the vegetation in Minnesota. In many regions they form the predominate ground cover. This handbook, therefore, will be welcomed by botanists within the state and others in similar regions of the country, for it is a guide to 92 different kinds of ferns and fern allies. The inclusion of 85 distribution maps and more than 200 figures considerably enhance the usefulness of the book. Many of the figures approach in size the average specimen that they depict. A pictorial glossary and identification keys are included. The home gardener will find useful advice on how to transplant ferns successfully from their native habitats and information on which varieties are best adapted to growth in different kinds of gardens or locations. Teachers and students in high school and colleges, as well as nature study groups of at least six states, will find this small volume an extremely useful reference text.

Manual of Indian Forest Botany. N. L. BOR. 441 pages, 31 plates. Oxford University Press, 114 Fifth Avenue, New York 11, N. Y. (1953) 25 rupees.

The author of this book is Assistant Director, Royal Botanic Gardens, Kew, England and formerly Forest Botanist of the Forest Research Institute, Dehra Dun, India. The text was prepared to acquaint students and foresters with the hundreds of species of trees found in Indian and Burmese forests. The scientific aspects of classification (extensive keys) and the equally important field characters of trees are both included for each group or family. Thirty-one plates of illustrations are to be found at the end of the book.

North American Prairie. J. E. WEAVER. 348 pages, illustrated. Johnsen Publishing Company, 1135 R Street, Lincoln 8, Nebraska. (1954) $5.00.

Written by a pioneer and authority on grassland ecology, this attractively designed book is the first to deal exclusively with the prairie community. Dr. Weaver, now professor emeritus at the University of Nebraska, has literally spent his life studying this particular biotype and has authored or coauthored some 80 articles, 4 monographs and 11 books. The nature of grassland and its constituent species of grass, lowland and upland communities and their principal forms, roots and rhizomes, the seasonal aspects of the prairie and its stability are discussed. Plant-soil relationships, the effects of settlement and drought, and the processes of degeneration and regeneration form the subjects of other chapters. Most of the 87 illustrations are photographs. The author, in retrospect, writes, "Grassland soils through untold centuries have been thoroughly protected by the unbroken mantle of prairie vegetation. The vegetation and soil are closely related, intimately mixed, and highly interdependent upon each other and upon the climate. Hence prairie is much more than land covered with grass."

MISCELLANEOUS

Science and Civilisation in China. Volume I. Introductory Orientation. JOSEPH NEEDHAM. 318 pages, illustrated. Cambridge University Press, 32 East 57th Street, New York 22, N. Y. (1954) $10.00.

Dr. Needham has completed a monumental task in the preparation of seven volumes on the development of science and civilization in China. An outline of the complete series is given in Volume I. The structure of the Chinese language is first explained. This language, which has remained ideographic for more than 3,000 years, probably did much to preserve the unity of Chinese culture in the face of great geographical barriers. These geographic features of the country are the subject of a portion of the book. What archeological finds have revealed of the pre-historic and Bronze Age culture, the nature of the ancient kingdoms, the rise and fall of dynasties from 1000 B.C. down to the Manchu period of the middle 17th century, are all summarized. In each dynasty the course of political and military events, the intellectual development and cultural advances, the economic conditions, and especially the scientific and technological achievements are discussed.

The Kinetic Basis of Molecular Biology. FRANK H. JOHNSON, HENRY EYRING, and MILTON J. POLISSAR. 874 pages. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. (1954) $15.00.

The Kinetic Basis of Molecular Biology will probably become a milepost in the interpretation of biological reactions. It is the first book in which modern reaction rate theory, developed since 1935, is extensively and systematically applied to biological phenomena in both relatively simple and highly complex systems. For those not familiar with reaction rate theory, the book contains the briefest essentials of thermodynamics, and of classical, quantum, and statistical mechanics. Although mastery of these basic subjects generally requires prolonged study, the fundamentals briefly presented in these early chapters provide the inquiring reader with a basis for understanding the background upon which reaction rate theory is built. The authors state in their preface, "For some years biology has progressed steadily toward an ultimate goal of rational interpretations of both structure and function at the molecular level—toward a broad and basic science of molecular biology. The present work is a step in this direction, with the emphasis primarily on the kinetic basis. . . ." Dr. Johnson is associated with Princeton University, Dr. Eyring with the University of Utah, and Dr. Polissar with the City College of San Francisco and the University of California Medical School.

Effects of Radiation and Other Deleterious Agents on Embryonic Development. A Symposium sponsored by the Biology Division, Oak Ridge National Laboratory, April 1953. 337 pages. A limited number available free of charge from A. Hollaender, Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tenn., upon the establishment of a need for the publication.

The contributors to this symposium are: James G. Wilson, Roberts Rugh, James N. Dent, Ernest L. Hunt, Liane Brauch Russell, W. L. Russell, Samuel P. Hicks, Dietrich Bodenstein, Josef Warkany, F. Clarke Fraser, H. Kalter, B. E. Walker, T. D. Fainstat, Walter Landauer, B. H. Willier, James N. Yamazaki, Stanley W. Wright, Phillis M. Wright and Paul Weiss.

Fundamental Principles of Bacteriology. A. J. SALLE. 782 pages, illustrated. McGraw-Hill Book Company, 330 West 42nd Street, New York 36, N. Y. (4th edition, 1954) $8.50.

The fourth edition of this comprehensive text has been completely revised and rewritten and many new illustrations added. Although it is said to be written for beginners, any student using it as a text should have a sound basic background in biochemistry. The chemical approach is maintained throughout the book. Classification is based on the sixth edition of "Bergey's Manual of Determinative Bacteriology," which is generally accepted as standard in this country. Dr. Salle is Professor of Bacteriology at the University of California, Los Angeles.

Biographical Memoirs. Volume XXVIII. National Academy of Sciences. 311 pages. Columbia University Press, 2960 Broadway, New York 27, N. Y. (1954) $4.00.

This twenty-eighth volume in the Biographical Memoirs of the National Academy of Sciences, Washington, contains the ten biographies of: Francis Gilman Blake, Gano Sillick Dunn, Merritt Lyndon Fernald, Frederick Parker Gay, Edwin Bret Hart, Ludvig Hektoen, Raymond Alexander Kelser, Elmer Ambrose Sperry, George Linius Streeter and Frank Clifford Whitmore.

Health for Effective Living. EDWARD B. JOHNS, WILFRED C. SUTTON and LLOYD E. WEBSTER. 473 pages, illustrated. McGraw-Hill Book Company, 330 West 42nd Street, New York 36, N. Y. (1954) $4.75.

The usual texts on Health, designed for a freshman or sophomore course in hygiene or health education, deal largely with anatomy, offer some physiology and conclude with a section on community health. This book, based on a nationwide investigation of college students, emphasizes the emotional and social adjustment of college youth, although it does not neglect the basic concerns in body maintenance, such as nutrition, balanced daily living, and protection against disease, accidents, and drugs. A section on "Orientation in Health Education" discusses the advancements in attitude, even on an international scale, towards better health; three chapters are devoted to the problems of mental health; three to a discussion of dating, marriage, and parenthood; alcohol and drugs are treated at some length; and the modern concepts of diseases, communicable, chronic and degenerative, are the interesting subjects of two other chapters. Illustrations are plentiful and apt; each chapter lists, at the conclusion, suggested popular reading about the subjects discussed on the preceding pages.

Directory of Hydrobiological Laboratories and Personnel in North America. Edited by ROBERT W. HIATT. 324 pages, illustrated. University of Hawaii Press, Honolulu, Hawaii. (1954) $3.75.

With the current increased interest in hydrobiology and the expansion of facilities for research and teaching in the field, an up-to-date directory was definitely needed. In 1951 the AIBS Advisory Committee on Hydrobiology to the Office of Naval Research undertook to assemble the necessary information about Laboratories and Personnel and this neat, well-illustrated volume is the result. The Directory lists 187 stations, the provisions for instruction and research, the scope of the physical plant, the staff, environments and provision for publication. Biographical sketches of 1,300 personnel give institutional affiliation, address, field of specialization, current research activities and field experience by geographical region. Data for all laboratories are broken down into inland (freshwater) and coastal (marine) and segregated by geographical area. Several maps and numerous illustrations add considerably to the appearance of the book, which is printed by offset. This "Directory" should become the current reference for all interested in hydrobiological stations and personnel.

Chemical Pathways of Metabolism. Edited by DAVID M. GREENBERG. 460 pages. Academic Press Inc., 125 East 23rd Street, New York 10, N. Y. (1954) $11.00.

This is Volume I in a proposed series on the subject, and is meant to survey the existing knowledge of the chemical steps in the metabolism of the major constituents of living organisms. The authors and their subjects are as follows: A. B. Pardee, Free Energy and Metabolism; D. E. Green, Enzymes in Metabolic Sequence; P. K. Stumpf, Glycolysis; H. A. Krebs, The Tricarboxylic Acid Cycle; Seymour S. Cohen, Other Pathways of Carbohydrate Metabolism; W. Z. Hassid, Biosynthesis of Complex Saccarides; I. L. Chaikoff and G. W. Brown, Jr., Fat Metabolism and Acetoacetate Formation; and D. K. Fukushima and R. S. Rosenfeld, Sterol and Steroid Metabolism. Each subject, a chapter in length, is indexed in detail on the first page and heavily annotated. Each author has been chosen because of his current activity in the particular field about which he writes.

Biological Effects of External Radiation. Edited by HENRY A. BLAIR. 508 pages. The McGraw-Hill Book Company, 330 West 42nd Street, New York 36, N. Y. (1954) $7.00.

This book is Volume II, Division VI, of the *National Nuclear Energy Series* and presents declassified papers on the major part of the work done at the University of Rochester during the war period on the biological effects of X-radiation, along with a collaborative study of the chronic effects of neutron irradiation produced at the Biochemical Foundation, Newark, Delaware. The *Series* itself is being prepared as a record of the research work done under the Manhattan Project and the Atomic Energy Commission. When completed, it is expected to consist of some 60 volumes. These will be grouped into eight divisions, as follows: Electromagnetic Separation Project, Gaseous Diffusion Project; Special Separations Project; Plutonium Project; Los Alamos Project; University of Rochester Project; Material Procurement Project; and Manhattan Project. This particular volume contains seventeen papers.

Protein Metabolism. R. B. FISHER. 198 pages. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. (1954) $2.50.

One of the Methuen's Monographs on Biochemical Subjects (London), this small volume is built around the theme that protein metabolism is concerned with the concerted metabolism of the amino-acids, a process regarded as something distinct from the metabolism of the individual amino-acids. The author feels that the published literature on proteins and amino-acids is now so immense that little could be accomplished by summarizing any one phase. Instead he has selected an approach that places emphasis on the structure of scientific advance in the field and shows why that which appears in the literature as unequivocally established may not always be so. The author is a Demonstrator in Biochemistry at the University of Oxford, England.

Advances in Genetics. Volume VI. Edited by M. DEMEREC. 488 pages. Academic Press Inc., 125 East 23rd Street, New York 10, N. Y. (1954) $9.80.

This is the 1954 edition, Volume VI, of the now familiar *Advances in Genetics.* Contributors to this edition are: Raymond W. Barratt, D. Newmeyer, D. D. Perkins and L. Garnjobst, Map Construction in *Neurospora crassa;* Bentley Glass, Genetic Changes in Human Populations, Especially Those Due to Gene Flow and Genetic Drift; John Hancock, Monozygotic Twins in Cattle; Philip Levine, The Genetics of the Newer Human Blood Factors; D. Lewis, Comparative Incompatability in Angiosperms and Fungi; P. Michaelis, Cytoplasmic Inheritance in Epilobium and its Theoretical Significance; C. L. Remington, The Genetics of *Colias* (Lepidoptera); and Alan Robertson, Artificial Insemination and Livestock Improvement.

Biochemistry of Cancer. JESSE P. GREENSTEIN. Academic Press Inc., 125 East 23rd Street, New York 10, N. Y. (2nd edition, 1954) $12.00.

In speaking of this second edition, the author writes "Although the general outline of the first edition has been retained, the individual chapters have been pruned in some places and expanded in others. Many new tables and figures have been interpolated into the text. Newer approaches to carcinogenesis and to chemotherapy have been intensively developed in recent times, and these procedures, with their successes and failures, are paid due attention." Dr. Greenstein, who is Chief of the Laboratory of Biochemistry, National Cancer Institute, National Institutes of Health (Bethesda, Md.), cannot but reflect the optimism that is growing in the field of cancer research because so many experts are working at the existing problems and such an accumulation of knowledge is being secured.

Evolution as a Process. Edited by JULIAN HUXLEY, A. C. HARDY and E. B. FORD. 367 pages. The Macmillan Company, 60 Fifth Avenue, New York 11, N. Y. (1954) $4.25.

An outstanding collection of essays by eighteen distinguished European and American scientists, this volume brings together divergent points of view as well as present day agreement on the evolutionary process. The series is opened by Julian Huxley with a crystallization of the outlook of present day biology just half a century after the rediscovery of Mendel's laws. Dr. Huxley's essay stresses the idea that there definitely is one basic mechanism underlying the whole process of organic evolution; this is Darwinian selection acting upon the hereditary material discovered by Mendel and shown by modern geneticists to be, in spite of its particulate nature, a unified interacting system, the gene-complex. The other authors who contribute to this collection are: G. R. DeBeer, E. J. H. Corner, Hugh B. Cott, James Fisher, Sir Ronald Fisher, E. B. Ford, J. B. S. Haldane, A. C. Hardy, David Lack, Ernst Mayr, Bernhard Rensch, P. M. Sheppard, H. N. Southern, N. Tinbergen, T. S. Westoll, E. N. Willmer, J. Z. Young and S. Zuckerman.

Biological Applications of Freezing and Drying. R. J. C. HARRIS. 415 pages. Academic Press Inc., 125 East 23rd Street, New York 10, N. Y. (1954) $10.00.

Fifteen contributors, pioneers and authorities in their particular fields, have written the chapters of this volume. Although a method for drying frozen biological material has been known for over fifty years, the advantages of the process have only become fully appreciated in the last ten years. The preservation of blood plasma and penicillin during World War II spurred further work in other effects of low temperature on cells, tissues and chemicals with important practical applications of long-term storage of spermatozoa for artificial insemination, of red blood cells for transfusion, and of tissue "spare parts" for surgical purposes. At the present time, freeze-drying is used for the preservation not only of blood products and antibiotics but also of human milk, bacteria, tissue culture media, and viruses, and for the preparation and preservation of tissues for morphological and histochemical studies, and of specimens for electron microscopy.

Sex in Microorganisms. Edited by D. H. WENRICH *et al.* 362 pages. American Association for the Advancement of Science, 1515 Massachusetts Avenue, Washington 5, D. C. (1954) $5.75 ($5.00 to members of AAAS).

The contents of this book were presented, in the form of a symposium, at the 1951 Philadelphia meeting of AAAS. The material in the book is slightly expanded over that presented during the meetings. The authors and their subjects of discussion are: N. Visconti, Genetic Recombination in Bacterial Viruses; J. Lederberg and E. L. Tatum, Sex in Bacteria: Genetics Studies, 1945-52; W. G. Hutchinson and H. Stempen,

Sex in Bacteria: Evidence from Morphology; John R. Raper, Life Cycles, Sexuality, and Sexual Mechanisms in the Fungi; Ruth Patrick, Sexual Reproduction in Diatoms; R. A. Lewin, Sex in Unicellular Algae; D. H. Wenrich, Sex in Protozoa: A Comparative Review and Comments on the Origin and Evolution of "Sex"; D. L. Nanney, Mating Type Determination in *Paramecium aurelia:* A Study in Cellular Heredity; Charles B. Metz, Mating Substances and the Physiology of Fertilization in Ciliates.

Proceedings of the Seventh International Botanical Congress, Stockholm 1950. Edited by HUGO OSVALD and EWERT ABERG. 899 pages, illustrated. Chronica Botanica Company, Waltham, Mass. (1954) $17.35.

Printed in Sweden and imported by Chronica Botanica, this oversize tome will be of interest to all Americans who attended the Stockholm Botanical Congress in 1950. Many other botanists as well, who were unable to attend, will be interested in the published papers. The volume is a complete record of the Congress; sectional proceedings, general evening lectures, plenary sessions, exhibits, receptions and entertainments, and excursions and field trips. The sectional meetings are reported in abstract form but the addresses at the general sessions are printed in full. Papers are published in their original French, German or English. Numerous photographs, many of delegates from the various countries, others, group photographs of sectional participants, are interspersed throughout the book. A review of previous plant science congresses and their importance in the development of botany was given at one of the plenary sessions and is reprinted here.

Biology for You. B. B. VANCE and D. F. MILLER. 652 pages, illustrated. J. B. Lippincott Company, Washington Square, Philadelphia, Pa. (3rd edition, 1954).

This is an unusual text. The format is distinctive and experimental and the illustrations, running the gamut from line drawings and photographs in black and white, through two- and three-color plates to full color illustrations, are numerous and well-chosen. A section of review questions, problems and suggested reading concludes each chapter and an extensive glossary is included at the end of the book. Both of the authors and the consultant, W. R. Teeters, Director of Education in the St. Louis Public Schools, have been concerned with the teaching of high school biology and this attractive text is the result of their experience.

Practical Physiological Chemistry. P. B. HAWK, B. L. OSER and W. H. SUMMERSON. 1439 pages, illustrated. The Blakiston Company, Inc., 575 Madison Avenue, New York 22, N. Y. (13th edition, 1954) $12.00.

Both the publishers and the senior author point with justifiable pride to this thirteenth edition of an outstanding text, first published nearly fifty years ago. More so than any previous edition, this one has been extensively revised and expanded. The proportion of the book devoted to textual material, as distinguished from experiments and procedures, now occupies about one-half of the volume. Five chapters have been completely rewritten and several others have had new sections added. Experimental, analytical, and preparative methods, employing new techniques or research tools, have been added to all chapters. There is no question but that *Practical Physiological Chemistry* will continue to maintain its long-standing position in the field.

The Vitamins. Volume II. Edited by W. H. SEBRELL, JR. and R. S. HARRIS. 766 pages. Academic Press Inc., 125 East 23rd Street, New York 10, N. Y. (1954) $16.50.

This book, the second volume of *The Vitamins*, is the work of twenty-nine authors. Chapter subjects are: Choline, Vitamin D Group, Essential Fatty Acids, Inositols, Vitamin K Group, Niacin, and Pantothenic Acid. Each subject is broken down, for discussion, into: Nomenclature and Formulas, Chemistry, Industrial Preparation, Biochemical Systems, Specificity of Action, Biogenesis, Estimation, Standardization of Activity, Occurrence, Effects of Deficiency, Pathology, Pharmacology, and Requirements and Factors Influencing Them. The two volumes now offer as complete and authoritative a survey of the vitamins as is probably available.

Chemical Pathways of Metabolism. Volume II. Edited by DAVID M. GREENBERG. 383 pages. Academic Press Inc., 125 East 23rd Street, New York 10, N. Y. (1954) $9.50.

Contributors to this second volume of *Chemical Pathways of Metabolism* are: P. P. Cohen, Nitrogen Metabolism of Amino Acids; D. M. Greenberg, Synthetic Processes Involving Amino Acid; D. M. Greenberg, Metabolism of Sulphur-Containing Compounds; G. Borsook, Enzymatic Synthesis of Peptide Bonds; M. P. Schulman, Purines and Pyrimidines; L. A. Heepel, Nucleotides and Nucleosides; and S. Granick, Metabolism of Heme and Chlorophyll. A subject and author index and extensive bibliography in each chapter add to the usefulness of the volume.

LABORATORY MANUALS

Biology Activities. B. B. VANCE, C. A. BARKER and D. F. MILLER. 256 pages, perforated, illustrated. J. B. Lippincott Company, Washington Square, Philadelphia, Pa. (1954)

Laboratory Experiments in Physiological Chemistry. A. K. ANDERSON and G. H. PRITHAM. 179 pages. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. (2nd edition, 1954) $2.90.

Laboratory Manual on Fundamental Principles of Bacteriology. A. J. SALLE. 176 pages. McGraw-Hill Book Company, 330 West 42nd Street, New York 36, N. Y. (4th edition, 1954)

Botanists in Paris

SAMUEL L. MEYER

Florida State University, Tallahassee, Fla.

FOR the second time during the 20th century, the first was in 1900, an International Botanical Congress has met in Paris. From the initial strains of "La Marseilles" at the plenary opening meeting on July 2 to the final "Adieu" at the plenary meeting of closure on July 13, botanists, their wives and families, from many countries entered into the varied program of scientific sessions, excursions, tours and receptions arranged for their enjoyment by the officials of the VIII International Botanical Congress.

The Congress was held at the Sorbonne and in various buildings in the vicinity. The printed program listed meetings of the following sections: IUBS; Nomenclature; Botanical Terminology; Taxonomy, Systematics and Phylogeny; Paleobotany; Palynology; Phytogeography; Morphology and Anatomy; Cytology; Genetics and Experimental Taxonomy; Plant Physiology; Agronomical Botany; Forest Botany; Raw Materials of Vegetal Origin and their Standardization; Ethnobotany; Bryology; Phycology; Lichenology; Mycology; Phytopathology; Bacteriology; Protection of Materials and Equipments; Microbiology of Soils and Water; Antibiotics in Plant Biology; Protection of Nature; History of Botany; Botanical Gardens; and Mediterranean Botany. A number of sections were divided into sub-sections. Programs of sections and sub-sections included reports, communications, lectures and films.

Many of the shortcomings we have come to expect at meetings of AIBS societies appeared at the Congress. Speakers who were allotted ten minutes and who spoke forty; complete disregard of the simplest principles of good public speaking, regardless of the language used; lantern slides too crowded with material to be of any value to the speaker much less to the audience; and drawings much too large to be projected with the equipment available made us feel very much at home.

On the other hand, the arrangement of programs with time for discussion actually listed in the program and the wholehearted enthusiasm with which the audience entered into the discussion were in delightful contrast to our procedures.

On Wednesday afternoon, July 7, a plenary session was dedicated to the celebration of the one hundredth anniversary of the founding of the Botanical Society of France. On this occasion, Dr. Harriet Creighton presented official greetings from the Botanical Society of America.

In addition to the strictly scientific aspects of the meetings, other events of interest were provided for the Congressists. A reception for the Presidents and some foreign delegates was given by the "Conseil Municipal" of Paris at the Hotel de Ville, the city hall of Paris; a visit and general welcome reception to all Congressists was sponsored by the Museum National d'Histoire Naturelle at the zoo in Vincennes; a visit to the Jardin des Plantes; to the Arboretum Vilmorinianum; to Versailles with a conducted tour of the chateau and the gardens, a cold plate dinner, and in the evening the performance in sound and light, entitled "A toutes les gloires de la France" presented in front of the chateau; an all-day excursion to Fontainebleau with stops at various points in the forest, a tour of the chateau, luncheon at the race-course of the "Vallée de la Solle"; a reception of Presidents and Chief-Delegates by the Minister of National Education; and a general visit of lighted rooms and farewell social meeting in the Musée du Louvre.

It is expected that some Congressists took advantage of the opportunity to see other sights of Paris including the Eiffel Tower, Notre Dame, the Arc de Triomphe, the Tomb of Napoleon, and the Basilica of the Sacré-Coeur. It was evident that for this meeting, wives of botanists were not content to stay at home. Many accompanied their husbands on the trip to Paris! For them, there was a trip by pleasure boat on the Seine, a dress-show by a well-known couturier, a guided visit of the Cité and Old Paris, and a visit to Saint-Germain-en-Laye and to the park and chateau of "La Malmaison." It was rumored also that some Congressists even found time to visit the famed "Flea Market," the Folies-Bergère and the Moulin Rouge!

For the neophytes at such congresses and for those whose attendance at international gatherings is a routine procedure, this most recent of botanical congresses was a memorable occasion. Many in both groups are already looking forward to the IX International Botanical Congress which will be held in Montreal in 1959.

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The following notice is important . . . to every biologist and to the future of the AIBS. We hope you will pause to read it as well as the editorial on page 5 by the Chairman of the Governing Board, H. B. Glass

Types of Membership in A.I.B.S.

Six classes of individual memberships have now been set up in AIBS. The new categories will enable individual biologists to share in supporting the aims of the Institute beyond their present participation through member societies. A subscription to the *AIBS Bulletin* will form part of the membership privileges in *all* six classes.

Honorary Member. A person who, by reason of long and distinguished service to the biological sciences, is elected to such membership. An honorary member pays no dues.

Life Member. A person interested in the purposes of the Institute who chooses to pay his dues in a lump sum $100.00

Supporting Member. A person interested in the purposes of the Institute who pays annual dues of..$10.00

Professional Member. A person interested in the purposes of the Institute who pays annual dues of....$3.00

Member. A person who is a member in good standing of a Member Society and who pays annual dues of at least $1.00 through this Society.

Associate Member. A person, usually a student, without professional status, who is interested in the purposes of the Institute and who pays annual dues of.....$1.00

Inquiries about membership or dues (payable by check) should be addressed to: *Executive Secretary, American Institute of Biological Sciences, 2101 Constitution Avenue, Washington 25, D. C.*

The Passing of the Fleet

A. F. CARR, JR., *University of Florida*

EDITOR'S NOTE: *Dr. Carr was the principal speaker at the General Meeting (September 6th) of the recent AIBS convention. The following is an editorial condensation of his address. We regret that limited space in the Bulletin forces us to print only an abbreviated version of Dr. Carr's fascinating narrative.*

IT was the first of May, 1503. It was the homeward leg of the fourth voyage, and the blue line of the isthmus fading astern was the last Columbus would ever see of the New World mainland. At odds with his pilots over the course, beleaguered by fickle winds and a strong westerly current, he missed his goal by 300 miles. But on the tenth day he raised two low islands and ran down the channel between them. His grumbling crews were cheered by the sight of great numbers of turtles about the shores and cluttering the seaways, the chronicle says, like little rocks. Columbus named the islands Las Tortugas.

The Turtle Islands, however, did not keep the name Columbus gave them. Fifteen years later Ponce de Leon gave it to a group of keys off Florida. The Tortugas of Columbus became the *Caymanes*—the Cayman Islands—and for three hundred years the vast "flotas" there—the fleets of breeding green turtles—were a prime factor in the growth of the Caribbean. As the settlements grew and got hungry, ships of half a dozen flags converged on the untended islands in June. They took away as many as their holds and decks would carry. The turtle flotas were as infinite as herring schools. Or so it seemed.

The vitamin hunger of sailors, which came from nowhere and made men's gums grow over their teeth, and could send a corpse a day sliding over the rail, practically disappeared in the Caribbean after the discovery of Chelonia, the green turtle. No other edible creature could be carried away and kept so long alive. Only the turtle could take the place of spoiled kegs of beef and send a ship on for a second year of wandering or marauding. All early activity in the new world tropics—exploration, colonization, buccaneering and the maneuverings of naval squadrons—was in some way dependent on the turtle. Salted or dried it everywhere fed the seaboard poor. It was at once a staple and a luxury—a slave ration, and in soup and curries the pride of the menus of the big plantation houses. More than any other dietary factor the green turtle supported the opening up of the Caribbean.

Chelonia had all the qualities needed for a role in history. It was big, abundant, available, savory and remarkably tenacious of life. It was almost unique in being a marine herbivore—an air-breathing vertebrate that grazed submarine beds of seed plants. It was easy to catch with simple equipment because its pasture lay under clear shallow water. Moreover, each June the females came ashore wherever there was sand to lay their eggs and you had only to walk the beaches and turn them on their backs. Chelonia's abundance expressed its straightforward ecology. It ate one kind of plant that spread continuously over great areas and knew no season. Grown-up greens were too big and hard for most predators and too fast and wary for the rest. The other turtles of these seas had gummed up their energy cycles by eating animals, which of course had their own complex problems and uncertainties. So the carnivorous turtles led a solitary, scattered life while the greens stayed in one place and grazed all day, only one link down the feeding chain from the sun itself. They grew fat and numerous and succulent, and in every way a blessing.

Today, the Atlantic green turtle can no longer be reckoned as a major asset. And worse, I believe that if it is not effectively protected it may soon be extirpated as a breeding resident of American waters.

The documentation of the decline of Chelonia is voluminous and clear. One by one the famous old rookeries were destroyed. The first to go was Bermuda and next were the shores of the Greater Antilles. The Bahamas were blanked out not long after, and boats from there began to cross the Gulf Stream to abet the decimation in Florida, where vast herds foraged in the East Coast estuaries and on the Gulf flats of the Upper Peninsula and a great breeding school came each year to Dry Tortugas.

One nesting ground stood apart from all the rest in its fecundity and stirred the wonder of all who saw it. This was the Cayman Islands. The breeding aggregation there supported the biggest turtle fishery in America. The history of this fishery—its burgeoning and slow exhaustion, the wrecking of the rookery by heedless killing of the females that came ashore to lay, the plight of the people who had no other way to live and their tenacity in following the declining schools from one remote shore to another—is as extraordinary from the standpoint of human ecology as from that of resource depletion. At first the Cayman sloops worked off the south coast of Cuba, but the schools there soon dwindled. They then built bigger boats and scouted more distant shores, and finally stumbled upon a vast new turtle ground on Mosquito Bank just off the coast of Nicaragua, some 350 miles over open seas from Grand Cayman. There lay a cluster of keys where fresh water could be had, a shallow sea set with bars and rocks, miles and miles of blade grass flats and turtle herds that looked to the Cayman captains like home in their grandfather's day.

That was more than a hundred years ago. The Caymanians are still the only important export turtle hunters in the Caribbean and the Mosquito Banks are still the main source of green turtles for the American market. These people feel no alarm over the future of Chelonia because they have seen no reduction in the turtle population of their time. The young men of today catch about as many turtles in a season as their fathers did. They are most concerned over unstable markets, since except on the home shores where it is a staple, green turtle is in demand only among gourmets. They are plagued by lack of transportation for their catch and over England's disinclination to squander dollar credits for the makings of aldermanic soups.

However, it is very doubtful if the Cayman people will be the ones to deliver the last blow from which Chelonia will not recover. They, and the harpooners, who take the turtles on the grazing banks, are attacking the species where it is most resilient. It could almost surely stand many times more of that kind of pressure. But what it cannot stand is being deprived of the benefits of reproduction. That much of the course of conservation is self-evident. But at this point our procedure is blocked by an astonishing ignorance of the biology of the animal. Most of the countries and peoples with a stake in the Caribbean littoral would be in sympathy with the idea of saving the green turtle. But once persuaded of the necessity of doing something they embarrass you by insisting that you tell them exactly what to do.

Until quite recently the problem was not critical. There were hundreds of islands and keys and mainland beaches where nobody lived and where one could imagine thousands of safe nests erupting yearly multitudes of little turtles. But since the war the wild beaches have begun to disappear. Population pressures, outboard motors and planes have ac-

counted for thousands of aluminum roofs shining in clearings in the seaside scrub. The elimination of the nesting grounds continues and it is this that will finish Chelonia.

The most serious handicaps in any effort to save the green turtle is our ignorance of its migratory movements. Fishermen everywhere believe that the green turtle migrates. Such a belief can also be found in the writings of naturalists. But nowhere in the canons of zoology is there a shred of what could be called scientific evidence to prove it.

The best way to answer the questions about Chelonia's supposed migratory habits would be an extensive program of tagging and this is what I hope to get under way. Meanwhile, however, I have wandered all about the Caribbean, sifting the hearsay, comparing it with the old writings and corroborating by direct observation wherever I could, trying to see how a marking campaign should be organized. The best source of word-of-mouth information is the Cayman Islanders. They are a cooperative and articulate race, with a flair for natural history and a heavy stake in turtles. To assess the quality of their contribution it is necessary to know something of the way they operate their fishery.

The turtle schooners leave for the banks in the Fall. There they establish local headquarters on one of the islands with freshwater wells, where a crawl is built to hold the accumulating catch of the season. The schooners go out on the banks Monday morning and return to the Cays on Saturday. The turtle ground is an extensive tableland of sandy bottom covered with grass (Thalassia) and set with scattered rocks and coral heads. The turtles feed all day on the flats and move to the rocks at night to sleep. The schooners divide up the good turtling areas and send out catboats—17-foot dories with three-man crews—to set nets over marked rocks. When the turtles surface to blow they are entangled in the nets. The night's catch for each catboat is transferred to the schooner and on Saturday the week's turtles are taken to the crawls on the keys.

This bank turtling is carried on only from August to April. From May to August a recess is compulsory—because there are no turtles to catch. All turtle men believe that the turtles leave Mosquito Bank in May and June and congregate to mate and lay on a section of the Costa Rican coast called Tortuguero—Turtle Boque. This is no idly devised story but an interpretation essential to the operation of the fishery.

All you actually see is that the turtles go away. The females go full of eggs and come back spent. During the time they are away huge fleets of turtles appear at Turtle Bogue, mate there off shore and lay their eggs on the beach. These schools are far bigger than the year-round Costa Rican population, and local feeding grounds are inadequate to support them. They clearly come from elsewhere. Obviously some sort of migration has occurred but it does not prove that any part of the Costa Rican flota came from the Mosquito Bank. The Cayman turtle men, however, have indirect evidence to support their belief. If the Bank season has been unsatisfactory some of the boats go down the coast to a point between Prinxapolka and Pearl Key Point where they set their nets on the shallow mud flats. Here they may find large, transient schools grazing and moving southward. The captains all believe that these schools are migrants from the Banks, heading for Tortugero. Good turtling on the mud flats comes in April and August, which is just what you would expect if you were intercepting the coming and going of migrants from the north. By September the turtles are back on the Mosquito Bank feeding grounds.

I have lately talked with deepwater captains who have seen schools of greens on the move in open water off Panama, heading west, and in the opinion of these observers, toward Turtle Bogue. All the way from Venezuela to Chiriqui Lagoon fishermen say their local green turtles go west to breed. The people at Tortuguero believe that the nesting congress is a mixture of arrivals from north and south. They say that the two arrive separately, with the southern fleet usually ahead of the northern. This last is one of the points for which I found slight direct corroboration. In both walking the beach at the beginning of the nesting season for two Junes and flying low over it another year, it was apparent that the southern beaches were reached first and occupied by nesting turtles.

Among the stray observations that seem to strengthen the argument for turtle migration are the anecdotes about Chelonia's strong homing instinct. The stories are widespread and in the Cayman Islands the homing abilities of the green turtle are a matter of common knowledge. The Caymanians are all brought up knowing this. When they hold a turtle derby to celebrate the end of a good season, and tie colored balloons on lines to the flippers of culls left in the crawls and let them go in Great Sound, and they all move away due south without a hitch, nobody is surprised. South is the course to Mosquito Bank, and that is where they came from. You may call it folklore but it's the kind that has to be mostly right or somebody will starve. The captains, through years of association with the movements of turtles on the banks, are positive that the homing urge brings individuals back to a particular rock to sleep after a day of foraging several miles away. Even more significant are the stories of turtles returning over a distance through which they were carried on a ship's deck. I have accumulated six such anecdotes that seem to demand consideration. They were told by Cayman captains, experienced professionals who understood the nature of evidence, and knew that I was not looking for entertainment. One in particular was told by Captain Charles Bush of Georgetown, Grand Cayman, who at one time or another was captain of nearly every schooner that sailed out of the islands. During the 1924 season Captain Bush, on Mosquito Bank, caught an unusually large male green turtle that attracted attention both because of its size and because all four flippers had been notched by the bites of small sharks or other fish. The turtle was branded and almost immediately sent to Key West with the rest of the catch. There it was received and paid for. The following season Captain Bush was back on the banks, having heard meantime that the October hurricane had hit Key West and wrecked the turtle crawl. He was working the same territory as the season before and one evening, through his water glass saw the big male turtle with scalloped flippers. The old boy should by now have been soup but he wasn't; and the only thing to do was catch him again. They set a net on the rock and three hours later the old turtle was in it and the brand put on him five months before clearly visible on his belly. The following month they sent him back to Key West and the same merchant bought him for the second time. That Captain Bush showed himself to be a practical man with no sentimentality enhances the credibility of his story.

All such evidence lends support to the tales of Chelonia's long-haul migrations. What is there, then, about the strip of beach at Turtle Bogue that attracts the fleets from such distances around the Caribbean? Perhaps Tortuguero lies along the pathways of certain routes that are most feasible for migration. Or, perhaps the convergence here expresses ingrained patterns of response that once made sense but now are adhered to through evolutionary inertia. Certainly there is nothing evident in the lay or structure of the beach itself that could account for the appeal. It is just twenty-four miles of black sand swept by heavy surf and with no protecting banks or reefs off-shore. The unimposing shore of low dunes is covered with sea oats, sea grape and cocoplum and back of it stands scrub grading into swamp along a slow river. Coons and pisotes make a business of egg hunting, and when the fleet is in, ocelots, snakes and even jaguars may come over from the inland forests. In late June the dogs of the towns along the railroad, miles back inland, come over in packs, across all kinds of rough terrain, called by who knows what insight to the migration of the turtle schools. Even the nests overlooked by the dogs and coons and concealed by

hard rain are not entirely spared. If the little turtles emerge by day the buzzards learn of it and struggle among themselves over the stream of hatchlings. At night, when most of the nests hatch, the buzzards are asleep but out beyond the breakers a slashing line shows where the jackfish scoop and cut at the paddling hatchlings. It is clearly no lack of enemies that explains the pilgrimage to Turtle Bogue.

However, the enemy that will probably deal the death blow to Chelonia is man. Reproduction of the Tortuguero schools can at any time be cut off by the existing commercial operation which is so organized that every female that comes ashore can be turned and taken away without ever laying her eggs. All along the Central American coast the governments own a strip of the land-edge, extending inland for a mile from the breakers. There are two possible sources of revenue in this strip, the extensive coconut fringe and the tortoguero—the turtle rookeries. Every year the Tortoguero beach, the most valuable on the coast, is rented like all the rest at public auction. The highest bidder, the *contratista,* appoints a manager or *capataz,* who is in direct charge of a corps of *veladores,* the "stayers-awake," who each patrol one mile of shore and turn the turtles on their backs as they arrive. By Costa Rican law the veladore must wait and let each turtle dig her nest and lay, but this would cost him time and since there is no one to know, he turns the turtle where and when he finds her and hurries on to find another. Each female is dragged just behind the reach of hightide waves and because the sun on her belly would kill her in a few hours, the veladore builds over each turtle a little shelter of coco thatch. During the height of the season in July he may turn thirty or forty turtles between sunset and dawn. For each he receives about thirty-eight cents. Since this is a remote and dangerous coast, blocked behind by swamp and rivers, the veladore has no way of delivering his turtles to market except by launch. There is a law that says the launch must pick up turned turtles every two days but since there is only one launch and often a continuous string of squalls along the coast there are times when no launch comes for days or perhaps a week. Then the turtles die each day by the dozens. When the launch does appear, the veladore, usually with the help of his numerous children, ties chunks of balsa to each turtle's fin and sets them to sea where dugouts from the launch chase and gather them in.

It is a deadly system. Operated at capacity it could destroy the entire rookery. The reason it has not done so is the failure of the veladores to work full time. The apathy of the hunters is due to the irregular arrival of the launch—to the fact that any time spent on the beaches is gambled because their catch may never be picked up. And the unreliability of the launch is only a sign of the erratic post-war market. Should this improve, the launch will come on schedule in spite of the squalls. Meanwhile, the shore is settling up, the local demand is growing, and the chance for Chelonia to establish rookeries elsewhere has gone. From this angle the picture is dark.

Viewed from the standpoint of the opportunities for intervention the situation looks different. Territorially, Chelonia's interests and ours overlap only on the sea beach, and even there it comes when we're asleep. And because the creature congregates to breed, real protection for a few beaches might be all we need to bring back the fleets Columbus found.

It is not often that we are offered a set of circumstances so promising; a one-item feeder with its pastures undamaged, vast in extent and used by no other animal; a species attuned to building and thriving in dense populations and yet flexible enough to proliferate and scatter in dilute colonies; above all, a depleted species, the cause of whose depletion is clear and surely possible to remedy. There is still a skeleton breeding stock and the best of the remaining nesting shores are the least cluttered by man. Group action by the governments concerned would surely save Chelonia and build unity and strength in the Caribbean by raising the yield of the sea to the people around it.

In the field of live-resource management, it is not often you can hope for so much.

The Role of the National Science Foundation in Biological Science

LOUIS LEVIN, *National Science Foundation*

THREE years have elapsed since the Director of the then newly created National Science Foundation discussed before the A.I.B.S. the plans and hopes of the Foundation. (A.I.B.S. Bulletin, Vol. 1, No. 5, October 1951). Now, after three full years of operation, it is appropriate that a further report be made on the role of the Foundation in relation to the biological sciences.

Although the functions assigned to the Foundation by the legislation which created it are widely known, it may be worthwhile to mention briefly here those which are of interest to biological scientists. These functions are directed towards the promotion of basic research and education in the sciences by (a) assisting in the development of a national policy for the promotion of basic research and education in the biological sciences, (b) financial support of basic research, (c) awarding of graduate fellowships, (d) fostering of the interchange of scientific information.

What is the Foundation doing to discharge these obligations? The general operating policy of the Foundation is based on the philosophy that its primary mission is to encourage science. Science is now a large and very important component of our national culture, economy, and defense. This increasingly important role of science has led to a rapid rise in the level of expenditures in this area. Many federal and private agencies are engaged in the conduct or support of research. Most of these programs are aimed at specific objectives such as the improvement of health, agricultural practice, military defense, etc. Many of these operations overlap, but certainly all have a direct influence on the wellspring of our scientific resources—the colleges and universities of the nation.

The unprecedented growth of science and its increasing importance as a component of our social structure make it necessary that serious attention be given to the creation of policies for the safeguarding of this activity. The National Science Foundation considers that the "policy function" is one of its primary responsibilities. It is to be noted that basic research is specifically identified as the special area of consideration.

In recognition of this responsibility, recently reaffirmed in

President Eisenhower's Executive Order of March 17, 1954, the Foundation is presently engaged in collecting data on the status of science, its place in our society, its financial requirements, and the training and availability of research manpower. Such studies in part are being carried out by the Foundation staff and in part by others under grant and contract. A considerable portion of these studies has originated spontaneously within the scientific community itself—an occurrence which is welcomed and encouraged by the Foundation in accordance with its belief that the welfare of science and the role it will play in the future are in large measure dependent upon the interest and participation of scientists and their professional organizations. Examples of studies generated by scientists and supported by the Foundation are: the Survey of Physiological Science now being completed by the American Physiological Society, the Study of the Status and Development of Psychology in the United States conducted by the American Psychological Association, and a study of The Results of Twenty-Five Years of Endowed and Grant-Supported Research in The Biological Sciences at the University of Chicago by Dr. Ilza Veith. Such studies are expected to produce important data on the status and needs of these fields as seen through the eyes of the scientists themselves.

Perhaps of major interest to the readers of this *Bulletin* is the research support program of the Foundation in the life sciences. This program is maintained in consonance with the information-gathering or policy function of the Foundation and is also directed towards the promotion of basic research. The philosophy of this program can be best expressed by the statement that the Foundation is keenly interested in providing support to all areas of basic life science, from the agricultural sciences to the medical sciences. In fact, the belief that basic research in the biological sciences is indistinguishable from that in the medical sciences led to the decision that the projected separate divisions be combined into a single Division of Biological and Medical Sciences. The Foundation is not supporting research in applied aspects of the life sciences. It should not be assumed, however, that the mere fact that a research project has a practical aspect automatically rules it out for consideration. Rather, the criterion applied is whether a given piece of research may be expected to produce new fundamental information. If such a possibility appears to exist, the project is considered to be within the scope of interest of the Foundation.

The Division of Biological and Medical Sciences thus supports basic research in all areas of the life sciences, including the psychological sciences, anthropology and related areas. Its operations are carried out under a number of programmatic headings: Anthropological and Related Sciences, Developmental Biology, Environmental Biology, Genetic Biology, Molecular Biology, Psychobiology, Regulatory Biology and Systematic Biology. When a proposal is submitted to the Foundation, it is assigned to the Program to which its subject matter is most closely related. Interdisciplinary proposals are handled as Divisional or inter-programmatic business.

During the first three years of its operation, the Division of Biological and Medical Sciences has received more than 1,000 proposals. To satisfy all these requests would have required between twenty and twenty-five million dollars. Because of the very limited funds available to the Foundation, particularly during the first two years, less than one-third of these requests were activated with an allocation of approximately $3,500,000 in grants. This has necessitated a very careful selection of the most highly meritorious proposals. As a result, a large number of worthy proposals have had to be carried over from one year to the next. With the availability of increasing appropriations for the support of research, this situation has been somewhat relieved. It is expected that during the fiscal year 1955 a somewhat greater proportion of meritorious requests can be supported.

Several unique features of the granting policy of the Foundation are worthy of mention. The Foundation takes the view that when a grant is made in support of a project, sufficient funds should be immediately obligated to provide for a period long enough to assure the investigator an opportunity to achieve a significant advance in his research. An advantage of these long-term grants is that the investigator may budget the entire amount of the funds over the period for which the grant is made so as to most benefit his research. Not only does this assure him more fluidity of operation but it also provides a measure of security to personnel who are paid with grant funds. Thus, one-year grants are rarely made. The average duration of all life science grants made during the past year is 2.6 years. Renewals of grants are not made as such. Rather, an investigator may apply for another grant for continued support of his research. In such a case, he competes on an equal basis with others who have not previously received Foundation support.

The Foundation believes that the investigator is the best judge of how the granted funds shall be used with greatest profit to his research. Accordingly, the investigator is allowed wide latitude, within the policies of his own institution, to rebudget the funds made available to him by the grant,

A rather broad view is taken of how research can most profitably be supported. As might be expected, most support is provided for employing assistants, technicians, etc., and for purchasing expendable supplies and permanent equipment (which remains the property of the institution to which the grant is made). Grant funds may also be used for payment of publication costs of worthy scientific books and monographs, for travel incident to the actual research (as for field trips), attendance of meetings and visiting other laboratories, for purchase of special equipment, and, when justified, for the payment of a portion of the principal investigator's salary. Indirect costs (overhead) are limited to fifteen percent of the direct cost.

To assure the maximum progress of science, there is a vital need for the support of many activities over and above the direct support of research. One such activity is the interchange and dissemination of scientific information. Although large meetings dealing with general areas of science have been successfully held for many years, there appears to be a need for small conferences and symposia relating to distinct and specialized areas of science. Such meetings serve as forums where latest findings, theories and ideas may be freely discussed and the status of knowledge in that field critically examined. Recognition of this need has led the Foundation to allocate a modest portion of its funds to the support of special conferences and symposia. The impetus for such conferences in the life sciences has in every instance arisen among the interested scientists. When the Foundation provides financial aid for such a meeting, it is pleased to help in other ways too, but prefers that the task of planning and organization be assumed by the interested scientists, or by their societies. Whenever feasible it also is preferred that the plans include publication of the proceedings and papers at the conclusion of the conference. During the past two years, conferences in the life sciences to which Foundation support has been given have included those on Photosynthesis, Methods of Steroid Determination in Blood and Urine, The Chemistry and Physiological Interrelationships of Glutathione, The Role of Proteins in Ion Transport Across Membranes, Development and Growth, Bioluminescence, and Physiological Aspects of Development of the Mammalian Fetus.

Attendance at scientific meetings in foreign countries is considered of great value to scientific progress and to improved international relations. Therefore, it appears anomalous that few granting agencies assist travel of American scientists to foreign countries. The Foundation each year has allocated funds to assist such travel. Most travel grants have been made for attendance at international congresses, although it

is recognized that scientists also usually visit foreign laboratories and otherwise improve themselves scientifically. To provide aid to such travel, the congresses most closely related to the Foundation's primary interest, basic research, are selected. Grantees are then chosen, usually with the aid of the appropriate American scientific society, from among the applicants who wish to attend that particular congress.

It has been the general policy of the Foundation to *assist* such travel rather than to pay full costs. This is consistent with the belief that although use of public funds for such purposes is justified by the value which accrues to the nation, nevertheless it is also true that the grantee himself derives personal benefits from the travel. Accordingly, it is believed that the scientist himself should bear at least a fraction of the costs. Furthermore, adherence to this policy makes it possible to provide aid to a larger number of worthy scientists. This practice has permitted the Foundation to provide support for travel to a number of biological congresses including those for Biochemistry, Microbiology, Genetics, Gerontology, Botany and Ornithology.

The Foundation also considers requests for aid of foreign travel for purposes other than attendance of specific international congresses. These are of great variety and include travel incident to exchange of professorships, temporary work at foreign laboratories, invited lectureships, and general visits to foreign laboratories. These requests are assigned to the program into which they most naturally fall and are then considered in competition with the usual research-support request.

In addition, the Foundation is interested in improving the dissemination of scientific information. It is prepared to consider requests for aid of studies concerned with improved abstracting, improved methods for retrieving scientific information, publication or other pertinent problems. Of particular interest to the readers of this *Bulletin* are the Foundation's grant to *Biological Abstracts*, a contract for translation of Russian scientific literature, participation in the support of the Biological Sciences Information Exchange, and a contract with the Library of Congress for a compilation of world lists of current biological periodicals.

Another principal activity which can again be tied in with the promotion of basic research and education in the sciences is the Foundation's fellowship program. Of utmost importance to the future of science is the continued production of well trained young scientists for, without a doubt, the most critical factors determining our scientific progress are the number and quality of our scientists. If our scientific effort is to be maintained at a high level, it is necessary that a proper proportion of our most brilliant young people should be attracted to scientific careers. Accordingly, the problems of recruitment of young scientists and their training are matters of paramount interest.

The Foundation awards fellowships, on a national competitive basis, for graduate and postgraduate study in all fields of science. This program is administered by the Division of Scientific Personnel and Education. During the first three years of operation, 1,741 predoctoral and 176 postdoctoral fellowships have been awarded. Of these, 477 and 69 respectively, have been for training in the life sciences.

The quotas of fellowships allocated annually to the various fields of science are roughly proportional to the demand as judged by numbers of qualified applicants. It is of interest to know that during these first three years the demand (and consequently the number of awards) has been heavily in favor of the physical sciences. It is not yet clear whether this is due to the greater attractiveness of a career in the physical sciences, to a lack of knowledge about the program among life science students, or to other factors. Nevertheless, the biological sciences have until now "demanded" and obtained only about one-fourth of the fellowships awarded by the Foundation.

Mention has been made of another type of aid to graduate training. Usually, the research grant allows for the payment of stipends to graduate or postgraduate students. Requests for grants specifically for the purpose of aiding student research are also considered and several grants of this type have already been made.

The Foundation has also been sympathetic to requests for assistance to conferences, symposia, and colloquia dealing directly with problems of science teaching. Again, it is preferable that the initiative for such meetings come from interested scientific groups rather than from the Foundation. It is noteworthy that in this connection, also, the physical scientists have shown much more activity than the life scientists.

A significant aspect of the Foundation's program, both in policy and operational matters, is the manner in which it relies upon the advice of active members of the scientific community. This principle was evidently also considered to be important by those who helped to establish the Foundation. Thus, the National Science Foundation Act provides for the National Science Board which consists of 24 members, many of whom are eminent scientists or closely related to science. The Foundation Act also provides that each Division shall receive general policy guidance from a Divisional Committee appointed by the Board. These Divisional Committees are composed of leaders in the scientific fields relating most closely to the operations of that Division. Each program within the Division is assisted by an Advisory Panel, again chosen from among the most eminent scientists active in the particular scientific area of interest to the program. These Advisory Panels bear the brunt of the work involved in evaluating research proposals submitted to the Foundation.

In addition, it is frequently necessary to create *Ad Hoc* Advisory Committees for special purposes. The members of these are always drawn from active scientists of the pertinent fields, most often with the aid of the appropriate scientific society. A good example of such a special committee is the one created last year with the help of the A.I.B.S. and its constituent plant science societies. It was the function of this Committee to develop criteria and to select the most worthy applicants for travel grants to the International Botanical Congress.

Finally, the Foundation frequently consults with or seeks the advice of individual scientists. Insofar as is possible, its scientific personnel is recruited from among the active scientists of the country. Thus, up to the present time, the Division of Biological and Medical Sciences has been fortunate in that, in addition to its permanent staff, it has had the services of seven active biological scientists each of whom left his university post to spend a year at the Foundation. In this way the Foundation maintains intimate touch with the representatives of science, and the views of scientists are reflected in its programs.

As may be surmised from the above account, the National Science Foundation participates in many activities in addition to the awarding of fellowships and the granting of funds for research. While these two activities may appear on the surface to be the chief functions of the agency, actually the Foundation's other activities are of equal or greater importance to long-range scientific progress.

The Foundation believes that it must do many things in behalf of the science of this nation, and that many forms of assistance to science, some yet unthought of, are needed. It seeks to aid science by a bold and imaginative program, and to provide a real stimulus and understanding to the nation's scientific effort. In so doing, it hopes to benefit not only science but also the national culture of which science is only one facet.

To discharge its responsibilties, the Foundation needs and solicits the help of scientists and their organizations. As an agency designed to promote research and education, it will listen sympathetically to all ideas from the "grass roots" of science. Conversely, the Foundation hopes that scientists and organizations from which it seeks aid will receive such solicitation with sympathy.

The Bio-Sciences Information Exchange of the Smithsonian Institution

A Clearinghouse for Research in the Bio-Sciences

STELLA LECHE DEIGNAN, Director*

THE Bio-Sciences Information Exchange is a development from the Medical Sciences Information Exchange, of the National Research Council, enlarged and renamed in recognition of its expansion into biological and psychological fields. Its increasing use as a clearinghouse for current research vividly demonstrates the value of an exchange of information on work just beginning or not yet ready for publication. This paper is designed to introduce the Exchange to those members of the AIBS who are not acquainted with it, to stimulate registration of additional research, and to augment the use of its services.

The history and development of the Exchange have been previously described[1, 2]; it will suffice here to outline briefly its present status and to discuss those functions of special interest to investigators.

Although the Exchange derives its total support from the seven government agencies which award grants or contracts for research in the life sciences, the cooperation of the major fund-raising agencies and private foundations has been a valuable asset and a source of much of the material in the Exchange. These national granting agencies, both government and non-government, inform the Exchange of their awards. The Exchange then requests the recipients of awards to provide brief summaries of their research problems for the purposes of exchange of information. The request carries a full explanation of the uses and dissemination of the material.

How much of the nation's research is supported from extramural sources is not known. It is evident that many investigations are carried on without benefit of additional funds, and that a clearinghouse which included intramural research would be more complete. In this connection the Exchange is meeting with some success in that a number of universities have begun to participate. Actually, however, the majority of the approximately 7000 active research projects presently registered are supported, at least in part, by national granting agencies.

What useful purpose is served by the clearinghouse? Its primary use is to coordinate the information from all sources and to keep the supporting and cooperating agencies currently informed on (1) the amounts and sources of support of investigators, institutions and geographical areas, and (2) the amounts and sources of support of broad and specific subject fields. It is in carrying out this second responsibility that the Exchange has become a clearinghouse which serves not only the granting agencies, but investigators and research institutions as well.

The development of a detailed subject index and the assemblage of a professional staff with competencies in the biological, psychological and medical fields has enabled the Exchange to put investigators in contact with others having similar interests by the simple device of providing copies of germane summary statements. The value of the Exchange obviously rests upon the quality of the summary material registered with it, the exactitude of the indexing, and the background knowledge and intelligence exercised in selecting pertinent material. The quality of the summaries is constantly improving and, if letters of appreciation from users of the Exchange are a measure, the service is an effective one.

The fear, by some, that investigators might refuse to write summaries of their research plans because of an objection to the preparation of "another piece of paper" or because of an apprehension that their ideas might not be protected from premature publication, has proved to be unfounded. Investigators are usually very cooperative in providing the Exchange with adequate summaries of their proposed or current research. They are also protected from premature publication of their work by a clear understanding, indicated on the form containing the summary and explicitly repeated in the reply to every request for information, that the material sent out is for the use of the recipient alone and not for reference in any publication without special permission directly from the persons furnishing the summaries. Besides, the writer of a summary is requested to omit from it any information that he considers confidential. There has been no instance of misuse of material sent in response to requests. Of the more than 5000 principal investigators and 7000 other professional persons associated with the research comprising the body of the information in the Exchange, only five have raised any questions on this point. One of these felt so strongly on reporting of any kind, even to agencies supporting his laboratory, that he wrote a paper on the subject and sent a reprint of it in response to the request for a summary. Another changed his attitude after he had had occasion to use subject information from the Exchange and has become a mild enthusiast. On the other hand, some investigators have even requested the Exchange to include their research in its roster.

Experience has shown that the best service is rendered through the technique of specific requests. The practice of periodic distribution of information was discarded after a trial period because the volume of material, even after division into broad subject fields, was overpowering and burdensome to the recipients. Under the present system, the screening and selection of material used in response to specific requests is done by the staff of the Exchange.

Requests for subject information come from three general sources: granting agencies, committees, and individual investigators. The kind of information made available to the first two groups differs in certain aspects from that which may be supplied the individual investigator. Except for the type of information carried in published reports[3, 4], only cooperating granting agencies are privileged to obtain information on amounts (dollars). It would be impractical to perform detailed surveys of all work in comprehensive fields for individuals, whereas it is reasonable to prepare them for properly constituted committees. The service to individual investigators is consequently limited to work related to one or a series of special problems.

*The views and opinions expressed here are those of the author and not necessarily those of the members of the Governing Board of the BSIE or the agencies they represent.

By way of illustration, a new granting agency, or an established one considering a reorientation of its program, may receive a detailed survey of the extent of research and amounts of support available for work in a broad field and showing the emphasis of research support in the various sub-categories into which the field may be divided. New granting agencies use this service to determine areas most in need of support. Similar surveys are performed for committees charged with the consideration or stimulation of special fields of research. The service to investigators, on the other hand, provides a knowledge of who is working on a specific problem or approach to a problem. In providing this service the Exchange differs from a reference library, in that it does not refer an investigator to a publication, but enables him to contact directly those with immediate and similar interests. The more specifically a request for information is phrased, the more efficient can be the service rendered in complying with it. The index maintained by the Exchange is so constructed that the professional staff can extract with considerable precision the particular work in which the requester is interested, thus saving him from having to read large numbers of summaries in which his field of interest is referred to only as a remote parameter of the other types of research. Requests for research in broad fields, such as "all" work on "connective tissue disease" or "rheumatic conditions" would embrace such a volume of research that the Exchange (unless the request came from a committee) would reply by sending a sampling of projects, whereas a request for "the histochemistry of collagen in relation to rheumatoid diseases" is sufficiently explicit to enable the staff to provide all pertinent research. Similarly, again with the exception of committees, a request for "research dealing with the chemotherapy of cancer" covers too broad and varied a field for detailed reply, whereas one for "the analogues of amino acids in the inhibition of cancer cell growth" adequately defines the particular interest of the investigator.

A recent review of approximately one hundred requests from investigators confirmed the belief that no two requests are alike. Most research is marked by an individuality in approach or in frame of reference and this valuable characteristic is preserved in the systems of the Exchange. The index has proved a most effective tool, whether in the grouping of related research or in locating particular problems. It permits the staff to organize the material in a variety of ways and to find, with a minimum of effort, research bearing on a special problem.

It has often been suggested that the index be published or be made available for distribution in some other manner. The index was developed for a special purpose and its usefulness beyond this purpose is doubtful. It changes daily in accordance with the appearance of new research and it frequently undergoes major and minor rearrangements to conform with new concepts or points of view. Its structure is not that of a classification nor that of an ordinary index; it is, rather, a series of independent indexes, each of which is complete for the topic under consideration. When a new interest or a different point of view develops, a new section of the index may be added with a minimum of effort. This structure is necessary because of the responsibility of the Exchange to correlate subject matter with the number of awards and amounts granted, and to reflect, on a daily basis, the myriad of administrative details coincident with the administration of programs supporting research through grants and contracts. These details dictate, in part, the structure of the index and limit its usefulness for other purposes. Its effectiveness within the Exchange is unquestionable, as is demonstrated by the rapidity with which subject requests are answered. A statistical analysis showed that the mode of the time required to answer all subject requests, including the survey type, is three working days, and 44% of the requests are answered in one, two and three working days.

A growing body of information on the interests and policies of national granting agencies, gathered in the normal course of its activities, permits the Exchange to assist investigators seeking sources of support. Exploration of purely local foundations soon led to the conclusion that it would not be practical to include their activities in the Exchange. The following statement from a recent report[4] partially explains the problem: "Considerable thought has been given to the wisdom of gathering concise information from purely local foundations. The diversity of such organizations and the lack of established granting policies with regard to type of research supported or the probable duration of interest in any research field have reasoned against the inclusion of these data. Most

FIGURE 1.

NOTICE OF RESEARCH PROJECT

BIO-SCIENCES INFORMATION EXCHANGE

SMITHSONIAN INSTITUTION

NOT FOR PUBLICATION OR PUBLICATION REFERENCE

ACCESSION NO. (Do not use this space) XYZ-1234

NAME AND ADDRESS OF INSTITUTION:

University of , Address:

TITLE OF RESEARCH PROBLEM.

Effect of Tumor-Damaging Compounds on the Enzymatic Activity of Normal and Malignant Tissue and on Excretion of Nucleoprotein Fission Products.

Give names, departments, and official titles of ALL PROFESSIONAL PERSONNEL engaged in the research.

_____, Professor of Biochemistry
_____, Special Lecturer in Biochemistry
_____, Graduate Assistant
_____, Graduate Assistant

SUMMARY OF RESEARCH PROBLEM — (200 words or less — Omit classified data and other confidential information.)

In the Bio-Sciences Information Exchange summaries of work in progress are exchanged with government and private agencies supporting research in the bio-sciences and are forwarded to investigators who request such information. Your summary is to be used for these purposes.

The object of this project is to study the mechanism of action of chemicals which induce damage in animal tumors. It is proposed to investigate the enzymatic changes produced in tumor-bearing animals treated with active components of podophyllin, colchicine and related compounds, etc

It has been reported that these compounds produce a marked decrease in cytochrome oxidase activity of tumor tissue from animals treated with these agents. This decrease parallels the damage induced in the tumors. It is proposed to investigate the effects on more specific respiratory enzyme systems related to cytochrome oxidase such as diphosphopyridine nucleotide (DPN) and flavinadenine dinucleotide (FAD) as well as the changes produced in the phosphorylating systems of energy transformation of glycogen

It is also proposed to study the effects produced on respiratory enzymes in different components of tumor cells (mitochondria, nuclei, etc.) obtained by fractional centrifugation and to observe the effect of repeated injections on the enzymatic changes occurring in tumor cells

In addition to the enzyme studies, investigation of fission products of nucleoproteins and action of dithiol compounds and derivatives will be investigated. The excretion of oxyproteic acids in tumor and non-tumor bearing animals, treated with tumor damaging chemicals, as well as excretion studies in patients with cancer and other diseases will be undertaken.

SIGNATURE OF PRINCIPAL INVESTIGATOR Professor of Biochemistry, School of Medicine DATE

INVESTIGATOR—DO NOT USE THIS SPACE

local foundations appear to be mechanisms for family or individual giving with primary interest in community services and welfare."

It is the exceptional local foundation which employs a permanent staff or which formulates or follows a consistent policy. The names, and sometimes the addresses, of the many local foundations which reach the Exchange have been listed by state in the belief that such lists may assist research institutions in their search for local sources of funds.

Investigators whose work is represented in the BSIE may be invited to participate in symposia, conferences, or cooperative research programs. They may even receive unsolicited additional support on problems of special interest to certain industries. These are side issues resulting from the increasing use of the Exchange as a clearinghouse.

The standard form on which research is registered with the Exchange is familiar to all recipients of awards from national granting agencies. This "Notice of Research Project" form was designed by representatives of the supporting agencies when the Exchange was established and has required only slight modification in the subsequent years. There are two variations of the form, one for extramurally supported research and the other for intramural research. They differ only in that the one used for grant- or contract-supported research has a space for the name of the granting agency. The forms are supplied, free of charge, to investigators who wish to record their research with the Exchange.

The summary contained in Figure 1 is reproduced with the permission of the principal investigator who submitted it. While it contains neither results nor report of progress, it illustrates, by its completeness and simplicity, the kind of abstract which effectively outlines a research problem in its initial stages. Brief summaries comparable to this are becoming recognized as a medium for the rapid and free interchange of scientific information. Such an exchange will be increasingly valuable as investigators become accustomed to employing this means of communication for work which has not reached the publication stage.

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[1] S. L. Deignan, *Science*, Vol. 113, No. 2942, p. 584, 1951.

[2] From "Psychological Notes and News," *The American Psychologist*, Vol. 8, No. 12, p. 759, 1953.

[3] S. L. Deignan and E. Miller, *Science*, Vol. 115, No. 2987, p. 321, 1952.

[4] S. L. Deignan and E. Miller, *Science*, Vol. 119, No. 3098, p. 661, 1954.

Marine Biological Laboratory Woods Hole, Mass.

SANDRA LLOYD LESSER, *Hunter College, New York City*

WOODS HOLE, Massachusetts, is more than a summer vacationist's stopover, a place where the railroad ends and where the steamer to Nantucket and Martha's Vineyard touches the mainland. So rich was the variety of marine life in its waters that this Cape Cod fishing village seemed the ideal location for a seaside institution devoted to research and study in the biological sciences. Just such an institution, The Marine Biological Laboratory, was founded there in 1888 and now, over 75 years later, Woods Hole has attained the stature of Biology Capital of the United States.

The M.B.L., as the laboratory is known, is the oldest existing biological station in this country. Unlike others it is not a division of a large university, nor is it sponsored by the government or industry. It is a private corporation, the members of which are the many scientists who work at the M.B.L. summer after summer. Part of the money to found the laboratory was raised from a series of popular-science lectures and from the presentation in Boston of a specially written, and now forgotten, operetta. Despite periods of financial stress and predictions that it could not last long, the M.B.L. not only has survived but it has grown from a small wooden building to some 25 structures including laboratory facilities and living quarters for the scientific community.

Over the years, the Marine Biological Laboratory has grown in reputation as well as in physical size. The visitors' register contains some of the most famous names in science, past and present. A few years ago four Nobel prize winners were resident at the same time: A. Szent-Gyorgyi, Otto Loewi, Otto Warburg, and the late O. Meyerhoff. Szent-Gyorgyi found the M.B.L. so much to his liking that he established the year-round Institute for Muscle Research there. Most investigators, however, can take advantage of the M.B.L. only during the summer months. From May to October about 450 scientists and students from about 150 American and foreign universities, colleges, and research institutes work at the M.B.L. For a small fee, they are provided with research facilities: laboratory space, chemicals, glassware, apparatus, and marine organisms. The last mentioned are collected by a fleet of laboratory-owned fishing boats. Many special services are available: high voltage x-ray equipment, photographic department, Tselius electrophoresis apparatus, deep freeze, ultracentrifuge, electron microscope, and facilities for handling and measuring radioactive materials. Although Louis Agassiz's stern admonition, "Study Nature Not Books," is prominently displayed in the main laboratory building, the M.B.L. in cooperation with the two other Woods Hole scientific groups (the Fish and Wildlife Service of the U. S. Department of the Interior and the Woods Hole Oceanographic Institute) maintains a library with one of the finest and most complete collections of scientific periodicals.

Investigations carried out at the M.B.I. cover the entire field of biology and slip past the ill-defined boundaries that separate biology from its sister sciences of chemistry, physics, and medicine. Early workers were concerned with the classification, description, and observation of marine animals. Today experimental zoology, cellular physiology, biochemistry, biophysics, and genetics are the main fields of endeavor. One of the largest areas of current M.B.L. research is the investigation of nerve cells. Here, the common squid with its giant axone plays a dominant role. Since summer is the reproductive season for many Woods Hole marine species, it is not surprising that embryology has always been a favorite M.B.L. research subject. Shortly after the founding of the laboratory E. B. Wilson, E. G. Conklin and others carried

Aerial view of Marine Biological Laboratory (center), Woods Hole Oceanographic Institution (right), and U.S. Fish and Wildlife Service (left).

out their famous descriptive and comparative studies of cell lineage; a little later came the "age of the egg shakers," the first experimental embryologists; at the turn of the century Jacques Loeb, working at the M.B.L., discovered artificial parthenogenesis. And since then, eggs—fertilized and unfertilized; from sea urchins, starfish, fundulus, clams, and annelids, to give only a partial list of sources—eggs have been the biological material in a variety of research projects which are often classified as biochemical, biophysical or physiological rather than embryological.

The M.B.L., famous as a research institution, serves a second, equally important function—that of helping to train the research scientists of tomorrow. Six-week courses in embryology, marine botany, physiology, marine ecology, and invertebrate zoology are offered every summer to qualified students who wish to make biology their future. What makes M.B.L. courses so valuable and enriching to the neophyte biologist are the field trips and the laboratory hours during which he works, often for the first time in his career, with live material instead of preserved specimens.

The physiology course is perhaps the most unique of those offered at Woods Hole. Prominent contributors discuss the controversial work and the current research efforts in their fields. But lectures are only part of the course, for students spend most of their time in the laboratory carrying out problems in cytochemistry, the ionic environment of the cell, and photochemical reactions of animals and plants, for example, with such outstanding investigators as Daniel Mazia, H. B. Steinbach, and George Wald.

In lectures, in the laboratories, even in social activities, the beginning zoologist enjoys the opportunity of informal talks with seasoned research workers and of listening to discussions between experts on just about every facet of biology. There is an unusual stimulating atmosphere at the M.B.L. which draws scientists back to Woods Hole summer after summer. Like the late E. G. Conklin who spent close to 60 summers at the M.B.L., they come first as students, then as beginning investigators, and finally as authorities in their special fields.

Mountain Lake Biological Station

BRUCE D. REYNOLDS, Director

THE Mountain Lake Biological Station is located in the western part of Virginia astride the Allegheny Mountains. An elevation of approximately 4000 feet insures a cool climate throughout the summer and provides diversified habitats with differences of 2500 feet in altitude within a ten-mile radius.

The Station owns about 1200 acres of wooded land and has collecting privileges on over 50,000 additional acres. Its holdings border the Jefferson National Forest for three and one-half miles. A hard-surfaced road leads to the top of the mountain and alongside of the lake, where an excellent resort hotel is located. The Station is two miles from the hotel. The Norfolk and Western and the Virginian railroads pass through Pembroke, ten miles distant, and one of the State's big airports is located 60 miles away, near Roanoke.

The physical plant consists of twenty-four buildings, two of which are constructed of stone, the others of wood. All

Mountain Lake Biological Station, Virginia.

are sealed, have hardwood floors, and are provided with electricity, hot and cold water, showers, toilets, etc. The meals are served in a common mess hall.

The laboratory contains an auditorium, classrooms, research rooms, stock rooms, photographic rooms, library, and is provided with much modern equipment.

The Station was established in 1929 by the University of Virginia and has been operated during the summers since, beginning in 1930. On July 17, 1954 its silver anniversary was celebrated. Although financed and controlled by the State, the Station has ever been regional in nature and appeal. This is largely due to the fact that the land was donated by private interests and the buildings were erected through grants made by the General Education Board.

From the beginning work at the Station has consisted of instruction on the graduate level and investigation of research problems. There are two five-week terms during the summer session and four advanced courses in biology are given each term. About twenty-five courses in various biological fields have beeen offered. Some of these are given nearly every year, others every other year, and some only occasionally. For the past two years a course in Radiation Biology has been offered with the cooperation of the Oak Ridge National Laboratory. Unlike many biological stations, the Mountain Lake Biological Station changes its instructors annually and thus makes it possible for those in attendance for several years to make contact with a large number of the prominent biologists of the country. This does not mean that none of the instructors return, for some have been on the staff numerous times and several have come back for two or more years.

With a botanist and a zoologist in continual attendance it is possible for graduate students to follow a research problem through to completion and receive a Master's degree for work done at the Station. Each year from one to five Master's degrees are awarded. The Ph.D. degree is not given during the summer session, but credit towards that degree can be obtained for work done at the Station. This credit may be transferred to other institutions if desired. With such an arrangement it is possible for graduate students to obtain a more varied selection of courses and to take work under better known biologists than can be done in any except the larger institutions of the country. Furthermore, the approximation to "life in a big family" prevailing at the Station enables one to learn to know others better in five weeks here than in five years on a formal campus.

From a research point of view the Mountain Lake Biological Station is not so unique. Except for a good climate, excellent facilities and fine companionship, Mountain Lake offers little that cannot be found at many institutions, unless one wishes to work on animals or plants indigenous to the area. Each year investigators are engaged in working on biological problems in several fields. The problems being investigated this year deal with such diverse things as: protozoa of molluscs, life-cycles of Mycetozoa, cause of plant galls, endoderm of *Smilax*, some gross aspects of body composition, renal blood supply of amphibians, shattering of chromosomes in *Tradescantia* by radiation, effect of radiation on *Habrobracon*, studies on branchiobdellids, nutritional requirements of *Arcella*, effect of acrasin on *Arcella*, effect of acrasin on ciliates, embryological studies of crayfish, life-cycle studies of birds, helminths of mammals of the area. A recent grant from the National Science Foundation has done much to stimulate research activity.

During past years papers have appeared from the Station dealing with taxonomic, ecological, morphological and physiological studies of many kinds of plants and animals. The archeogoniates are very abundant and other plants are well represented. Various classes of vertebrates abound in the streams and woods. Crustacea and aquatic insects populate the streams and an assortment of thecate rhizopods are found in the sphagnum bogs. The wood eating roach, *Cryptocercus punctulatus*, occurs in many of the rotting logs and it was during the first year of the Station's existence that Dr.

L. R. Cleveland discovered the protozoa in its intestine and began his monumental investigation on these organisms. For twenty-five years he has either spent time at the Station carrying on his investigations there, or else collecting material to be studied at the Harvard Zoological Laboratories.

Only from 75 to 100 persons can be accommodated at the Mountain Lake Biological Station and emphasis is placed on quality rather than quantity. In order to be admitted one must have at least twelve semester hours credit in the biological sciences and receive the endorsement of one or more reputable biologists.

Approximately 200 investigators and 750 students have worked at the Station. Members of the teaching staff have come from the leading institutions of the country. Included in the list would be: Augustine and Cleveland of Harvard; Woodruff of Yale; Rainey of Cornell; McClung, Schramm, Fogg, Zirkle, Wenrich and Diller of Pennsylvania; Will of Juniata; Johnson and Davis of Johns Hopkins; Burns of the Carnegie Institute of Washington; Karling of Purdue; Cosgrove of Iowa; Kirby of California; Painter of Texas; Faust and Penn of Tulane and many of the leading biologists in the southeastern states.

The Bingham Oceanographic Laboratory Yale University

DANIEL MERRIMAN, Director

THE Bingham Oceanographic Laboratory was established at Yale University in 1930 by a gift from Harry Payne Bingham, 1910. It began with a staff of one, in the person of Albert Eide Parr, whose early work dealt with descriptive marine zoology, specifically the accounts of fishes and invertebrates taken on the various cruises of Mr. Bingham's yacht, "Pawnee."

By the mid-1930's the interests of the laboratory had broadened to include the field of physical oceanography; these researches were highlighted by the contributions of Parr on the dynamics of the Gulf Stream, published in the *Bulletin of the Bingham Oceanographic Collection* and elsewhere. The position of the laboratory advanced further in 1937 with the establishment of the Sears Foundation and the publication of the *Journal of Marine Research*, and by 1940 the Bingham Laboratory had five staff members whose studies in pure oceanography were of high standing. In 1942 Dr. Parr assumed the directorship of the American Museum of Natural History in New York.

With the advent of World War II, the laboratory turned its efforts to the applied aspects of marine biology. It undertook research on the subject of marine resources, with the primary object of providing information for the increased and rational utilization of materials from the sea, studies which were both biological and biochemical in scope. In this period the staff reached its present size of 10-12 full-time workers. The chief aim of the laboratory is to provide research facilities for a small but highly qualified staff of investigators, and for a few graduate students who are trained with individual attention, both in the fundamentals and in certain specialties of the field of oceanography.

Following the war, the work of the Bingham Laboratory returned to a pattern which emphasized pure research: interestingly enough, a number of these studies have turned out to have practical application. In general the work has leaned on the biological side of oceanography, dealing with such diverse subjects as productivity, planktology, endocrinology, life histories of fishes, distribution, taxonomy, population dynamics, etc. Recently, however, certain staff members and their students have engaged more intensively in the physical and chemical aspects of oceanography—evidence of the interdependence of the branches of marine science, and of the fact that problems in one area cannot be solved without recourse to related fields.

Research is the primary business of the Bingham Laboratory. Its work and publications are supported by general funds from Yale University, special endowments, the Office of Naval Research, the National Science Foundation, grants from industry, and private gifts. One measure of the productivity of the laboratory is its output of scientific papers. The *Bingham Bulletin*, devoted to monographic studies, has published from its inception to date well over 5000 pages; the *Journal of Marine Research*, for shorter articles, now has more than 3000 pages to its credit. Both these publications have been edited from the laboratory, and the staff has contributed the majority of papers in the *Bulletin* as well as its share to the *Journal*. This, of course, takes no account of the 10-20 papers which members of the laboratory and graduate students contribute annually to other technical journals in the field of oceanography. Also edited from the Bingham Laboratory is the *Memoir* series of the Sears Foundation: the first number of *The Fishes of the Western North Atlantic*, on the Lancelets, Cyclostomes, and Sharks, by Bigelow, Farfante, and Schroeder (576 pp.) was published in 1948; a second number, *The Elementary Chemical Composition of Marine Organisms*, is a translation from A. P. Vinogradov's original Russian with a newly enlarged bibliography in 1953; and Part 2 of the first number, on the Sawfishes, Guitarfishes, Skates, Rays, and Chimaeroids, by Bigelow and Schroeder (562 pp.) will be off the press this fall.

Instruction is a second function of the Bingham Laboratory. To undergraduates, the only course offered is "Meteorology and Oceanography" for non-science majors. At the graduate level Yale University grants no degree in oceanography, but members of the staff of the laboratory* give courses in alternate years in "Oceanography" and in "Ichthyology." These courses are listed in the Department of Zoology, and the majority of students who do their research and theses under the partial direction of Bingham staff members come from that department, although the laboratory also attracts students from the Departments of Chemistry, Conservation, Geology, Microbiology, Physics, and Plant Science. Candidates for the Ph.D. degree in Zoology who qualify as original investigators in oceanography are not more than several a year—all the laboratory can handle in terms of the personal training it gives. The laboratory offers no summer courses and does not have a

**See p. 212,* *DIRECTORY OF HYDROBIOLOGICAL LABORATORIES AND PERSONNEL IN NORTH AMERICA, edited by Robert W. Hiatt and prepared under the auspices of the AIBS advisory committee on hydrobiology to the Office of Naval Research, National Research Council, Washington, D. C., and published by the University of Hawaii Press, 1954.*

Bingham Oceanographic Laboratory, New Haven, Conn.

sea-side location; however, although its facilities are limited it occasionally welcomes summer investigators whose interests parallel those of its staff. A modern research laboratory adjoining the Peabody Museum and an associated Hall of Fishes incorporating the most modern techniques of preparation and exhibition are planned for the future.

It is interesting to speculate on the *raison d'être* of the Bingham Oceanographic Laboratory. That Yale, as a part of its function as a great university, should be concerned with every aspect of the oceans of the world is no more surprising than that it should be concerned with atomic research or Boswell or Shakespeare. By definition a university is dedicated to the preservation and extension of knowledge, whether that knowledge is derived from the sciences, the arts or the humanities. The ideal of *learning* is the common bond that links scholars in every field, regardless of their individual interests, opinions and aptitudes.

The Bingham Laboratory preserves an opportunity for qualified investigators to work without interference, and it encourages the free, inquiring mind to range over the whole area of its chosen field. Oceanography can only reach its full development if dedicated scientists can pursue their basic researches without any restriction whatsoever. It was for this reason that Mr. Bingham made his original grant—as it was stated in the first issue of the *Bulletin*, "Founded for the purpose of oceanographic research." In our opinion there is potential danger to the future of science if we permit our best minds to be forced into the kind of contractual research which is essentially an end in itself. Applied research is not necessarily more beneficial to the human race than free scientific inquiry; indeed, the reverse can be argued with great force. At the Bingham Laboratory the speculative scientist is encouraged to explore any aspect of oceanography he considers significant, and we hold to the free pursuit of oceanographic knowledge for its own sake.

Biological Programs at AAAS Berkeley Meeting

December 26-31, 1954

THE 121st meeting of the American Association for the Advancement of Science on the campus of the University of California at Berkeley will include more than 300 sessions of all 18 AAAS Sections and of some 90 participating organizations. Programs of particular interest to biologists follow.

AAAS Section A—Mathematics and Third Berkeley Symposium on Mathematical Statistics and Probability

I. Statistics in Biology and Genetics. *Dec. 27, p.m.*

II. Statistics in Medicine and Public Health. *Dec. 28, 29, a.m.*

AAAS Section C—Chemistry and American Chemical Society, California Section

I. Symposia: "Viruses" and "Nucleic Acids." *Dec. 28, a.m. and p.m.*

II. Symposium: "Chemistry in the Harnessing of Biological Resources." *Dec. 29, a.m. and p.m.*

AAAS Section F—Zoological Sciences. International Conference on Animal Venoms

I. Ten sessions of invited and contributed papers on all phases and groups. *Dec. 27-30, a.m., p.m., eve.*

Cooper Ornithological Society

I. Contributed papers. *Dec. 29, p.m.*

Herpetologists League

I. Contributed papers. *Dec. 29, 30, a.m.*
II. Symposium. *Dec. 29, p.m.*

International Union for the Study of Social Insects

I. Symposium. *Dec. 28, p.m.*

Society of Systematic Zoology

I. Symposium: "Animal Courtship" and film. *Dec. 27, p.m.*
II. Public Lecture: African Animals. *Dec. 27, eve.*
III. Contributed papers (and film). *Dec. 28 and 30, a.m.*
IV. Panel: Museums. *Dec. 29, p.m.*
V. Symposium: "Desert Evolution." *Dec. 29, eve.*
VI. Symposium: "Australian Mammals." *Dec. 30, p.m.*

FG—Biological Sciences.

American Society of Limnology and Oceanography

I. Contributed papers. *Dec. 28-30, a.m. and p.m.*
II. Symposium: "Recent Advances in Biological Oceanography." *Dec. 30, a.m.*

Biometric Society, WNAR

I. Contributed papers. *Dec. 27.*

Ecological Society of America

I. Contributed papers. *Dec. 27, a.m. and p.m. and Dec. 28, a.m.*
II. Symposium: "Dew as an Ecological Factor." *Dec. 28, p.m.*
III. Field trip to Muir Woods (redwoods) and Stinson Beach State Park. *Dec. 29, all day.*

National Association of Biology Teachers

I. Films and panel: "Biology for Pleasure." *Dec. 28, a.m.*
II. Panel: "Biology for Living." *Dec. 28, p.m.*
III. Films and panel: "Biology for Survival." *Dec. 29, a.m.*
IV. Panel: "Biology Laboratory Problems." *Dec. 29, p.m.*
V. Field trip to Muir Woods and Stinson Beach State Park, jointly with *American Nature Study Society. Dec. 30, all day.*
VI. Conservation Education. *Dec. 31, a.m.*

Society of General Physiologists

I. Invited papers. *Dec. 30, p.m.*

Western Society of Naturalists

I. Symposium: "Natural Resources of the West." *Dec. 27, a.m.*
II. Invited papers in natural history. *Dec. 27, p.m.*
III. Invited papers: "Photochemical Effects in Biological and Biochemical Systems." *Dec. 27, p.m. and Dec. 28, a.m.*
IV. Contributed papers in parasitology and business meeting. *Dec. 28, p.m.*
V. Invited and contributed papers on Arctic Science, jointly with *Arctic Institute of North America. Dec. 28-30, a.m.*
VI. Symposium: "The Cell." *Dec. 29, a.m. and p.m.*
VII. Invited papers: "Teaching Problems in Biology." *Dec. 29, a.m.*
VIII. Concurrent sessions for papers in histology-embryology and in ecology. *Dec. 29, p.m.*
IX. Contributed papers in physiology. *Dec. 30, a.m.*

AAAS Section G—Botanical Sciences and Botanical Society of America, Pacific Section

I. Symposium: "Modern Views on Tissue Differentiation," cosponsored by the *American Society of Naturalists. Dec. 30, p.m.*
II. Cosponsorship of symposia of the following three plant science societies.

American Phytopathological Society, Pacific Division

I. Three-session Conference on Control of Soil Microorganisms. *Dec. 27.*
II. Symposium: "Crop Sequence and Plant Disease Control." *Dec. 28, a.m.*
III. Demonstrations, invited and contributed papers on soil-borne virus diseases. *Dec. 29, a.m.*
IV. Symposium: "Mode of Survival of Plant Pathogens in the Soil," cosponsored by *Mycological Society of America. Dec. 29, p.m.*

American Society of Plant Physiologists, Western Section

I. Symposium: "Mineral Nutrition." *Dec. 29.*

Mycological Society of America

I. Symposium: "Physico-Chemical Control of Structural Differentiation in the Fungi," cosponsored by *American Phytopathological Society, Western Section, et al. Dec. 28, p.m.*

AAAS Sections M—Engineering, C—Chemistry, and O—Agriculture

I. Symposium: "Air Pollution." *Dec. 28, a.m. and p.m.*

AAAS Section N—Medical Sciences

I. Four-session symposium: "Physiology of Growth—Normal and Abnormal." *Dec. 27 and 28, a.m. and p.m.*

Donner Laboratory of Biophysics, University of California, and AAAS Sections B—Physics and N—Medical Sciences

I. Symposium: "Cellular Biophysics." *Dec. 30, a.m. and p.m.*

AAAS Section O—Agriculture

I. Symposium: "Soil Management Problems in Western Agriculture," cosponsored by the *Western Society of Soil Science. Dec. 27, a.m.*
II. Symposium: "Water Supplies and Irrigation," cosponsored by the *Western Society of Soil Science. Dec. 27, p.m.*
III. Symposium: "Seed Production in the Western States." *Dec. 28, a.m.*
IV. Symposium: "Problems in Horticultural Crops." *Dec. 28, p.m.*

General Events

Phi Beta Kappa Address by Conway Zirkle. *Dec. 27, eve.;* AAAS Presidential Address by E. U. Condon and Reception. *Dec. 28, eve.;* Sigma Xi Address by Edwin M. McMillan. *Dec. 29, eve.;* RESA Address by Vannevar Bush. *Dec. 30, eve.;* Biologists' Smoker. *Dec. 30, 8:30-11:00 p.m.*

AAAS Annual Exposition of Science and Industry and the AAAS Theater, both *Dec. 27-30, inclusive.*

Coupons for sleeping accommodations and advance registration will be found in *Science* and *The Scientific Monthly*.

Scientific Manpower in Midyear

HOWARD A. MEYERHOFF, *Executive Director, Scientific Manpower Commission*

IT TOOK a technological war of world proportions to suggest that the problem of scientific and engineering manpower might profitably be studied, and the threat of another such war to initiate action. Inevitably, government agencies took the lead in analyzing those aspects of the problem that required immediate attention; but discontinuity of effort and uncertainty of purpose characterized official efforts and nullified any constructive or lasting result.

In response to appeals, the Engineers Joint Council created the Engineering Manpower Commission in 1950, and in 1951 the American Chemical Society appointed a Committee on Manpower. The chemists were convinced from the start that most manpower problems are common to all fields of science and that a single agency acting on behalf of all the major groups would accomplish much more than separate committees working without coordination. This conviction was shared by the organizations in the other disciplines, and in March 1953 representatives of the American Association for the Advancement of Science, American Chemical Society, American Institute of Biological Sciences, American Geological Institute, American Institute of Physics, American Psychological Association, Federation of American Societies for Experimental Biology, and the Policy Committee for Mathematics joined forces to incorporate the Scientific Manpower Commission in the District of Columbia.

With a dozen different government departments and agencies and an equal number of private organizations working on one phase or another of the specialized manpower problem, the Commission's first task was to study all activities in the field and to establish working relations that would eliminate duplication of labor yet assure that a comprehensive job would be done. Progress toward this goal was accelerated when Arthur S. Flemming, Director of the Office of Defense Mobilization, appointed the Commission's Director to membership on the ODM Committee on Specialized Personnel, and when the Engineering and Scientific Manpower Commissions agreed to merge certain of their activities and to divide the labor on others.

In such highly specialized fields as the scientific disciplines, recruitment, training, and utilization are successive but integrated problems. Superimposed on the troublesome dilemma of an inadequate supply of scientists to meet civilian demands was their liability for military service. Despite the excellent work of the Trytten Committees, the treatment accorded graduate students from May 1953 until June 1954 became completely irrational, and Selective Service announced as a policy its intention to induct graduate assistants without regard to the status of their graduate work. Graduate schools promptly supplied the Commission with facts and figures on arbitrary and ill-timed inductions of students in mid-career, and the Commission's findings were placed before the Office of Defense Mobilization. Action was soon taken, and, unless there is a complete disregard of the permissive provisions of the law, students and university departments will no longer be harassed by the uncertainties of badly timed and arbitrary reclassifications and inductions.

The Commission has also insisted on the adoption of more rational handling of occupational deferments, and, after a year in which it looked as if the policy was to draft all scientists, without regard to their irreplaceability in critical occupations, the Selective Service System should soon be directed to adhere to the intent of the deferment provisions in the Selective Service law. In 1955 it will be necessary for Congress to pass new legislation, in which it is hoped basic principles will be spelled out in sufficient detail to place them beyond dispute, and in which the chaotic reservist situation will be put in order. The Commission has been assured that its views will be sought when the prospective bills come up for consideration.

There would be little point in all this activity on the proper utilization of scientists for national security if there were not a shortage—at least in certain fields. The register of scientific personnel that is being prepared for the National Science Foundation will provide a check on the available supply, and the Office of Education's annual survey of college and university registrations and of degrees granted is a reliable tally of the number of new scientists and engineers that are added to the manpower pool each year. Very little, however, has been done to determine the demand and its relation to the supply. Unwilling to accept unsupported generalizations about current shortages, the Scientific Manpower Commission has undertaken its own survey.

A comprehensive study of industry's immediate requirements for scientists in each major field has been completed, and the results will soon be available. A comparable survey of demand for fiscal year 1954–55 in government agencies is in progress, and this will be followed by a study of requirements for teaching personnel during academic year 1954–55. Even reliable statistics such as are being assembled must be carefully interpreted before they can be properly used in the formulation of national policy, but until now anyone was free to propound an opinion or to propose a policy affecting the nation's scientific future and its security without being seriously hampered by facts.

Although there is always a shortage of high-caliber scientists, programs of recruitment should bear some rational relationship to prospective demand, and the results of the SMC surveys should be guides for action in each field of science. In preparation for service in this vital facet of the manpower problem, the Commission has compiled a bibliography of literature on career guidance and has assembled a file of material in current use among student counselors. Some disciplines have excellent material, two have virtually none, to place in the hands of interested young people.

Pamphlets, however, are no substitute for the inspiration that good teachers and good counselors can provide, and for this reason SMC has joined with the Engineering Manpower Commission to face the most acute shortage of all—namely, that of high school teachers of science. Working with the National Science Teachers Association, the Future Scientists of America, the AAAS Cooperative Committee on the Teaching of Science and Mathematics, the Academy Conference of the AAAS, the Thomas Alva Edison Foundation, and the Educational Council of the National Association of Manufacturers, it is now seeking the cooperation of its sponsoring agencies and their affiliates in a nationwide effort to resuscitate science where most young men and women have their first introduction to it. The Commission is also anticipating the time—a scant four years ahead—when the colleges will feel the pinch that has just gripped the high schools.

Science and technology are abstract terms that acquire substance only through people—men and women with the right temperament and with minds disciplined by prolonged training. Like any resource, the supply is limited—though renewable. Yet we have known less about it than about the size of our coal reserves or of our wheat crop. In fifteen months of operation, the Scientific Manpower Commission has begun to perceive the many facets of the manpower problem and to see how some of them may be resolved. The degree of success achieved will be directly proportional to the support and cooperation given not only by its sponsors, but by scientists themselves.

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Associated Seed Growers, Inc., one of the most progressive vegetable seed producing firms, and possibly the largest, has a history of almost a century. In the earlier years of American agriculture, seeds were largely saved by farmers and traded from one to another, with supplies of fresh stocks and new varieties coming from England and Europe. Vegetables were as a rule raised in the garden of the family that used them. Their production for market became a necessary consequence of the growth of industrial communities were homes were unprovided with gardens, and the development of canning gave further impetus to vegetable farming. The supply of seeds became better organized, and among firms founded about mid-19th century were three who eventually merged in 1927 to form the Associated Seed Growers, Inc., with the shortened form Asgrow as a brand name.

Early achievements of the merged firms included the development of many improved varieties of the popular vegetable species, particularly the first completely stringless varieties of beans. The breeding of vegetables was then an empirical art, since not until the 20th century was well advanced did practical application begin to be made of the Mendelian laws.

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At Twin Falls, Idaho, is the Asgrow Research Center, in charge of Dr. W. H. Pierce, for work on plant genetics, physiology and cultural methods. Here also is located a large seed-analysis laboratory with every modern accessory for the manifold purposes of seed technology. For the ultimate test of edible quality, samples of vegetables grown from Asgrow seeds are processed in a pilot canning and freezing plant prior to preparation for tasting panels which are regularly held.

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Berkeley, California

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The four basic groups of medicinal products produced at Cutter Laboratories are (1) *Human Biologicals*—represented by vaccines for diphtheria, tetanus, whooping cough, smallpox and typhoid. A heavy program on the Salk poliomyelitis vaccine is under way, together with other firms, under the general direction of the National Foundation for Infantile Paralysis. (2) *Veterinary Biologicals*—include a variety of products for protection against major animal diseases, such as blackleg, anthrax, etc. Research in these fields over a period of decades has yielded highly improved products. Hog cholera vaccines also have been the subject of extended research, and improved products, employing the latest techniques in tissue culture, have been developed. (3) *Human Blood Products*—Products from human blood were developed shortly before the beginning of World War II. The work was greatly expanded during the war in order to supply the much needed blood fractions. Several fractions from human blood were prepared to meet the demands of the armed forces during World War II. This work has been extended, and Cutter Laboratories was the first to make available commercially a line of human blood fractions. The better known fractions include albumin for the treatment of shock and certain kinds of edema; gamma globulin for measles modification; and a fibrinogen preparation (Parenogen) which has proved very valuable in acute afibrinogenemia. A gamma globulin has also been prepared from hyper-immunized persons which is used in the prevention and treatment of whooping cough. (4) *Intravenous Solutions and Equipment for their Administration.* A wide variety of sterile intravenous solutions ready for immediate use have been prepared for many years. Numerous solutions have been developed for specific needs in hospital practice. Dextran, a dextrose polymer, dispensed as a sterile, stable solution, has been widely used as a plasma expander in the treatment of shock and burns. A wide variety of disposable equipment for the collection of blood, and for the administration of blood and intravenous solutions has been developed. These administration sets are sterile, ready to use, comparatively inexpensive, and are discarded after a single use.

In addition to the above four product lines, a wide variety of researches are under way in the field of pharmaceutical specialties, including such fields as analgesics, anticonvulsants, and hypotensive agents.

Cutter Laboratories has its headquarters in Berkeley, California, on a 20 acre plot housing production buildings, research laboratories, warehouses, and administration facilities. In addition, it has a hospital solution and appliance plant on 35 acres in Chattanooga, Tennessee, which serves a growing Southeastern U. S. market. Sales are directed from Berkeley, and sales representatives work out of Branch offices located in Berkeley, Seattle, Los Angeles, Texas, Denver, Chicago, New York and a Southeastern U. S. region. Products are distributed through the wholesale and retail drug trade and hospital and veterinary supply houses. Export sales are handled by Cutter's totally owned subsidiary, Cutter International, a company within a company, and products go all over the world to places as far away as Lebanon and Indonesia.

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This growth has clearly established the importance of research, and the company now is devoting several million dollars annually ($7,905,000 in 1953) to a widely diversified

(Continued on p. 34)

The University of Florida Meetings

HIDEN T. COX, Convention Director

HURRICANES Carol and Edna are lurking in the neighborhood, the weather is stiflingly hot over much of the country, and it is really a fearfully long trip to Gainesville. These must have been the thoughts of many biologists as they made their last-minute preparations to attend the AIBS-sponsored meetings at the University of Florida. The gratifying registration total of 1,804 is testimony that the worth of these meetings to individual biologists overrides personal considerations of comfort and convenience.

Each of the 2,200 persons who made the trip to Gainesville must have been impressed with the detailed plans that had been made by the Committee on Local Arrangements and by the University administration, and with the efficient manner in which these plans were carried out. "Hospitality" could very well have been the keynote word of this convention. From the time a visitor boarded a University bus from his plane or train until he was again put aboard for his return trip the University of Florida seemed to anticipate every need he might have. The baggage handling service, the efficient registration and housing procedure, the intra-campus transportation, the excellent and low-cost meals, the many interesting events arranged for families, the beautifully organized field trips, all were evidences of careful thought and effective planning.

During the convention as many as 26 concurrent sessions were held. A total of 910 papers reported on specialized problems of research, applied biology, or teaching. *The American Society of Naturalists*, the *Botanical Society of America* and *Nature Conservancy* were concerned with general biology, botany and zoology. Taxonomy, morphology, anatomy and field studies occupied the attention of the *American Bryological Society*, the *American Fern Society*, the *American Society of Plant Taxonomists*, the *Mycological Society of America*, the *Phycological Society of America*, the *Society of Protozoologists*, the *Society of Systematic Zoology*, and the *American Society of Ichthyologists and Herpetologists*. Two organizations, the *National Association of Biology Teachers* and the *Florida Association of Science Teachers*, jointly discussed the problems concerned with the teaching of biology. Microbiology was represented by the *Society for Industrial Microbiology* and the various aspects of genetics by the *American Society of Human Genetics*, the *Genetics Society of America*, and the *Tomato Genetics Cooperative*. The *American Society for Horticultural Science* understandably placed considerable emphasis on citrus fruits at its meetings. The physiologists were represented by the *American Society of Plant Physiologists*. One of the larger meetings was that of the *Ecological Society of America*. Marine and fresh water biology was the concern of the *American Society of Limnology and Oceanography*. The *Society for the Study of Evolution* held three sessions as did the *Biometrics Society (ENAR)*. Two honor societies, *Sigma Delta Epsilon* and *Phi Sigma*, met with AIBS, the latter for the first time.

A number of panel discussions and symposia of general interest were scheduled by some societies and joint symposia were arranged for overlapping fields of interest. "How to Make Research Work in the Field" was a panel discussion offered by the *Amer. Soc. for Horticultural Science*, as was "Plant Introduction in the Vegetable Crops Programs." This society also scheduled symposia on "Research Problems in Floriculture," on "Heavy Metals in Plant Nutrition," and jointly with the *Biometric Society*, "The Use of Variance Components in Horticultural Research." The concern of members of the *Horticultural Society* for training workers in their field was shown by the panel discussion "Our Most Valuable and Least Valuable Course and Training Toward a Doctorate in Horticulture." In this same vein the *National Association of Biology Teachers* presented a symposium entitled "The Improvement of Biology Teaching." Two symposia of particular interest to southeastern biologists were "Origin of the Flora of the Southeastern Coastal Plain," presented jointly by the *American Society of Plant Taxonomists* and the *Botanical Society of America*, and "The Origin and Evolution of the Biota of Florida," which was a joint enterprise of the *American Society of Ichthyologists and Herpetologists* and the *Society for the Study of Evolution*. Of equal interest was "The Origin of the Biota of Middle America" scheduled by the *American Society of Naturalists*. The *Ecological Society* gave a symposium in honor of W. C. Allee entitled "Interspecific Competition and Cooperation—To What Extent Do They Control Abundance and Distribution?" This society also organized a panel discussion on "1954 Perspectives in Human Ecology." The *Industrial Microbiologists* were concerned with two important symposia: "Microbial Populations and the Selection of Antibiotic-Producing Microorganisms" and "Microbiological Deterioration." One symposia of general interest, "The Communication of Research Results," was sponsored by the AIBS Publications Committee.

The annual banquet, with an address by the President or an invited lecturer, is for many a biologist the highlight of his society's meeting. The high order of excellence of these lectures was maintained at the Florida meetings. Among such lectures of more than passing interest were "A Look Ahead in Horticultural Research" by F. P. Cullinan, James V. Neel's "On Some Pitfalls in Developing an Adequate Genetic Hypothesis," "Amphibian Calls and Their Significance," by C. M. Bogert, "What is Ecology" by Lee R. Dice, "Quo Vadimus Mycologici" by W. H. Weston, "Man is a Part of Nature: What This Means in the Teaching of High School Biology" by E. A. Anderson, "Fun with Fungicides" by J. G. Horsfall, "Adventures Among the Flagellates" by T. L. Jahn, "What is a Gene?—Twenty Years Later" by M. Demerec, and "Chemistry and Criminalistics" by Mary L. Willard. At the general meeting for all participating societies, scheduled for Monday evening of the convention period, well over 1,000 people enjoyed an excellent lecture by Archie F. Carr, Jr., of the University of Florida, entitled "The Passing of the Fleet."

Any report of the Florida meetings would be incomplete without reference to the field trips that were so competently organized by various local society representatives. The state of Florida, figuratively and almost literally, was taken over by biologists. Sixteen trips, varying in length from a few hours to four days, were undertaken. Twelve of these trips started from Gainesville, two from Tallahassee, and two from Miami. Many impromptu trips to surrounding points of interest were made by small groups of biologists. All in all, field trips probably played a more important role in the success of the Gainesville meetings than at any previous AIBS convention.

The Biological Sciences Exhibit Hall was located in the handsome Recreation Room of Broward Hall. It should be considered highly significant of the value of these meetings to commercial concerns that 24 such organizations saw fit to reserve space at these meetings which, because of geographical location, could not attract as large attendance as did the 1952 and 1953 conventions. Publishing houses represented were:

John Wiley & Sons, C. V. Mosby Co., Prentice-Hall, Inc., W. B. Saunders Company, Philosophical Library, McGraw-Hill Book Company, Wm. C. Brown Company, Blakiston Company, Association of American University Presses, Macmillan Company, and Burgess Publishing Company. Booths displaying laboratory equipment and other products of interest to biologists were maintained by: Climax Molybdenum Co., American Optical Co., Carolina Biological Supply Co., American Tobacco Co., Halco Scientific Instrument Co., Charles Pfizer and Co., National Spectrographic Sales Corp., E. R. Squibb and Sons, Florida Agricultural Supply Co., Bausch and Lomb Optical Co., Versenes Incorporated, Phipps and Bird, and the Baltimore Instrument Company. In addition to these there were the AIBS Biology Library booth and several noncommercial exhibits. The University of Florida erected a display picturing its research and extension activities in the biological sciences. There was an exhibit of research facilities in the southeast sponsored by the Association of Southeastern Biologists. AIBS maintained an information booth and an exhibit was presented jointly by the Bio-Sciences Information Exchange and the Chemical-Biological Coordination Center. The Armed Forces Medical Museum was represented in the exhibit hall as was Phi Epsilon Phi.

A most welcome addition to this year's exhibit hall was the attractive Coca-Cola Atoll. In this area the Gainesville Coca-Cola Bottling Company gave away "cokes" during the entire convention period. It is difficult to say whether the continuous crowd in the Atoll was attracted more by the refreshments or the lovely University of Florida coeds who served.

The arrangements made for the entertainment of families reflected the same thoughtful planning that the local committee members gave to all other facets of the convention. The ladies of the University gave a tea on Sunday afternoon, and on Monday morning a coffee for wives was held in the garden of the President's home. The University recreational area—Camp Wauberg—was open to AIBS members and their families. Specially conducted tours to Silver Springs, Ocala, St. Augustine and Marineland occupied the time of a number of visitors.

The AIBS Placement Service registered 110 biologists during the convention period and arranged interviews in connection with 40 available positions. This facet of the convention has been developing steadily and is being utilized with satisfaction by both young biologists and persons in need of qualified personnel.

Press coverage of the Gainesville meetings was national in scope and drew the attention of readers from coast to coast to the outstanding research reported by biologists.

Statistics concerning a meeting of this type mean little in terms of the worth to individuals attending the sessions, but certain facts may be interesting. The official registration was 1,804. Just over 2,200 persons were accommodated by the central housing bureau. There were 910 research papers in the program and approximately fifty biologists participated in symposia. Only 6 states were not represented by at least one biologist giving a paper. Most heavily represented was New York State with 105 papers. Florida was second with 92. California was third with 78, followed by Texas with 59, Illinois with 51, Michigan with 50 and Maryland with 47. The nine states generally considered to comprise the Southeast contributed a total of 220 papers. Nine U. S. possessions and foreign countries were represented by 49 papers in the general program.

AAAS SYMPOSIUM VOLUMES

Sex in Microorganisms

Editorial Committee: D. H. WENRICH, University of Pennsylvania, *Chairman*
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N. Visconti of the Carnegie Institution of Washington at Cold Spring Harbor, discusses recombination of "genes" in viruses. J. Lederberg of Wisconsin and E. L. Tatum of Stanford review genetic evidence for "sex" in bacteria, and W. G. Hutchinson of Pennsylvania and H. Stempen of Jefferson Medical College describe cell fusions in certain bacteria. J. R. Raper offers a comprehensive coverage of sex in fungi.

R. Patrick of the Academy of Natural Sciences, Philadelphia, describes syngamy in diatoms; R. A. Lewin of the Maritime Regional Laboratory, Halifax, the sexuality of other unicellular algae, especially the flagellates.

In two chapters D. H. Wenrich covers sexual phenomena in some of the protozoa and discusses the origin and evolution of sex, based primarily on the protozoa, but including material about all of the microorganisms. D. L. Nanney of Michigan summarizes mating-type phenomena in *Paramecium aurelia* and some of the recent mating-type work from Sonneborn's laboratory. C. B. Metz of Florida State compares mating-type substances in *Paramecium* and other ciliates with those found in Metazoa. Extensive chapter bibliographies are included.

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One of the Company's current projects is publication of the Handbook of Biological Data, material for which is being assembled under the auspices of the AIBS. The first fascicle of the work—Standard Values in Blood—was released in 1952. It is expected that the fascicle on Standard Values in Metabolism and Nutrition will be published October 1954.

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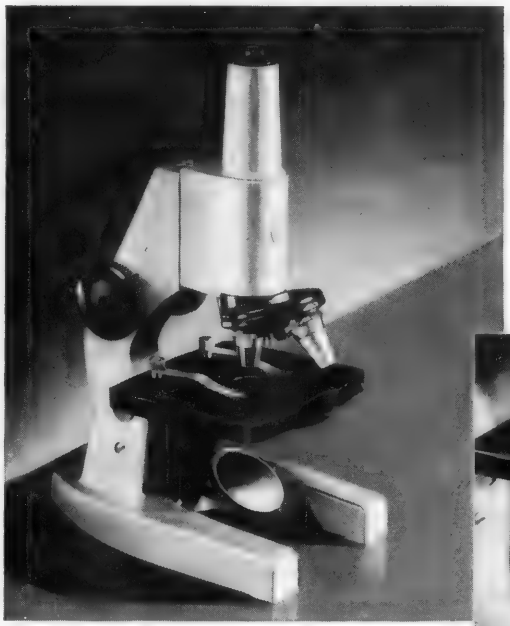

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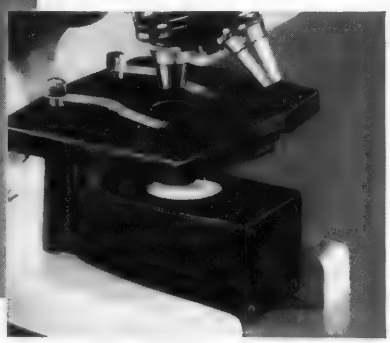

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